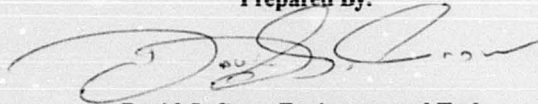


**PRELIMINARY ASSESSMENT  
SOONER DIAL  
CLINTON, OKLAHOMA, CUSTER COUNTY**

**August 11, 1992**

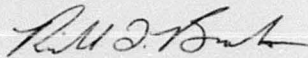
**OKLAHOMA STATE DEPARTMENT OF HEALTH**

**Prepared By:**

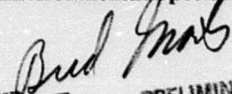


**David S. Crow, Environmental Tech.**

**Reviewed and Approved By:**



**Richard L. Brooks, Sr. Environmental Specialist**

**Reviewed By** 

**DATE** 8-92

**PRELIMINARY REPORT**  
This does not constitute  
final opinion of EPA

## Table of Contents

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## I. Introduction

The Oklahoma State Department of Health (OSDH) is tasked by the U.S. Environmental Protection Agency (EPA), as authorized by CERCLA and as amended by SARA, under the Multi-Site Cooperative Agreement (CA# V-00645-01) to conduct a preliminary assessment (PA) of the Sooner Dial site, (CERCLIS ID # not yet assigned). The site is located at 1002 South 10th Street, City of Clinton, Oklahoma in Custer County. The primary purpose of this PA is to assess the immediate or potential threat of wastes at the site that may have an impact on public and environmental health and to collect information sufficient to support a decision regarding the need for further action under CERCLA/SARA. The scope of this investigation includes the review of available information from OSDH files and conducting a comprehensive target survey.

## II. Site Description, Operational History, and Waste Characteristics

### *Site Description*

The Sooner Dial site is located in the NW/4 NW/4 Section 23 T12N R17E I.M. Custer County, Oklahoma (Reference 1,2). The site has the coordinates of 35° 30' 18.17" north latitude and 98° 58' 18.56" west longitude (Reference 2). The site is located in the southern area of the City of Clinton. This site is about 1/4 acre in size and is located in an urban area (Reference 3). Surrounding the site is both commercial and residential type properties (Reference 3). The number of persons considered to be on-site and within 200 feet of the site is about 15.75 persons; specifically, 3 workers and 12.75 residents (Reference 3,4). The nearest well is about two (2) miles southeast from the site (Reference 5).

### *Operational History*

The Sooner Dial Company was engaged in the refurbishing of aircraft instrument dials with radioactive and non-radioactive paints (Reference 6). The owner of the property is Ron Grubb (Reference 7). The former general manager of Sooner Dial was Charles E. Owens (Reference 8). This operation began in the 1940s and ceased operation in 1969 (Reference 3). The dials returned for refurbishing were stripped of old enamel paint by heating and/or unknown solvents (Reference 6). Allegedly, no precautions were taken to prevent the spread of radium (or radon) during the operation (Reference 6). The paint was applied to the stripped dials by either brush or by a silk screening process (Reference 6). It has been reported that the silk screens used at this facility were sold at an auction and as of 1/23/85, are located in Houston, Texas (Reference 10,11).

According to Harold C. Bay, former Sooner Dial Radiation Safety Officer, about every six months the sludge removed from the vessel used to strip paint from the dials was taken to a nearby landfill. He also stated that the landfill operator then covered the sludge with twenty (20) to fifty (50) feet of refuse and dirt (Reference 6).

According to other sources, a building on the Sooner Dial site was demolished in November 1984, and the rubble was disposed at the Ray Wichert property located about two (2) miles south of Sooner Dial (Reference 12). A Preliminary Assessment report for the Ray Wichert Property site has been submitted to USEPA-Region VI on July 30, 1992 by OSDH officials. At the present time, one of the former manufacturing structure of Sooner Dial is being used as a paint and auto body shop (Reference 3).

#### *Waste Characteristics*

There are multiple sources of concern in regards to the site. First and foremost is the radium contamination associated with the entire 1/4 acre site. The depth of contamination is not known at this time. It is believed that remnants of a foundation, and possibly a basement, have been buried or backfilled on-site (Reference 3). If a basement is in fact on-site, the possibility of deeper contamination would exist. The foundation/basement is presumably located in the vacant area of the site (Reference 3, Figure 2).

Radium is a radioactive earth metal that is brilliant white and tarnishes when exposed to ambient air (Reference 13). It decomposes in water and has a melting point of 700° Fahrenheit and a boiling point of 1737° Fahrenheit (Reference 13). Radium is highly dangerous, and must be kept heavily shielded and stored away from possible dissemination by explosion, flood, etc. It is known to be a common air contaminant and a highly radioactive element. Inhalation, ingestion, or bodily exposure to radium can lead to lung cancer, bone cancer, osteitis, skin damage and blood dyscrasias (Reference 13). Radium replaces calcium in the bone structure and can be a source of irradiation to the blood forming organs.  $^{226}\text{Ra}$  decays to  $^{222}\text{Rn}$  via alpha waves, and therefore, is considered the parent of radon (Reference 13).

Due to the fact that the solvent type is unknown and no information is available concerning how the spent solvents were managed, the solvents used to strip paint from the dials are also a source of concern. An on-site septic system was reportedly utilized during the Sooner Dial operations (Reference 15).

### **III. Pathway and Environmental Hazard Assessment**

#### *Groundwater*

The site sits atop the Woodward Series (Reference 16). The surface layer and subsoil to about thirty (30) inches is of a silt loam type. Permeability of this series is moderate, with available water capacity being high (Reference 16). Underlying the Woodward Series is a thin layer of Terrace Deposits a few feet thick (Reference 17). Terrace Deposits are characterized as being stream-laid deposits of sand, silt, clay, gravel, and volcanic ash (Reference 18). Underlying the Terrace Deposits is the Rush Springs Formation (Reference 17). This formation consists of fine-grained sandstone with some dolomite and gypsum beds (Reference 18). In the area of the site, this formation is about 300 feet thick (Reference 18). The

Rush Springs Formation is considered to be the bedrock aquifer within the area of the site. Wells commonly yield 25 to 300 gpm of water that is of good quality (Reference 19). Underlying the Rush Springs Formation is the El Reno Group. This group consists primarily of evaporites and shale (Reference 18). In areas where an alluvium or terrace aquifer overlies the Rush Springs Sandstone, water is available from either formation (Reference 18).

There are no public water supply wells within the four (4) mile study radius (Reference 5). There are six (6) private wells within the four (4) mile study radius (Reference 5). Populations served by private wells are described below (Reference 5). The nearest well is located about two (2) miles southeast of the site, and serves an estimated population of 2.55 persons (Reference 5). Based on the above information, all groundwater users are considered primary targets.

Distance from site (mi)	Estimated Population Served By:
	Private Wells
On-site	0
0 - 1/4	0
1/4 - 1/2	0
1/2 - 1	0
1 - 2	2.55
2 - 3	2.55
3 - 4	10.2
<b>TOTAL</b>	<b>15.3</b>

#### *Surface Water*

A nearby stormwater drain is thought to be the confluence of all surface water from the site (Reference 3). The nearest perennial stream is about 1.5 miles southeast of the site and is referred to as the Washita River (Reference 1). The probable point of entry (PPE) is located in the SE/4 Section 24 T12N R17W I.M. Custer County (Reference 1, Figure 3). The 15 mile target distance ends on the Washita River, and is located in the NE/4 Section 17 T11N R16W I.M. Washita County (Reference 1, Figure 3). Based on the above information, release to surface water is suspected. Within the 15-mile target distance, there are eight (8) surface water intakes used for irrigation purposes (Reference 20). The nearest surface water intake is about four (4) miles from the PPE (Reference 1,20, Figure 3). The average stream flow of the Washita River near the City of Clinton is 90 cubic feet per second (Reference 18).



The normal annual precipitation in the site's region is about 24 inches per year (Reference 21). The site does not lie within the 500 year flood plain (Reference 22). The Washita River is considered to be a fishery. Due to the nature of radium, and the unknown mobility of the solvents used on-site, the fishery is assumed to be a primary target. There may be a total of thirty (30) miles of wetland frontage area associated with the Washita River (Reference 25). Habitats of the endangered/threatened species listed below are known to be in Custer and/or Washita county(s) and are also assumed to be primary targets (Reference 23).

<i>Species</i>	<i>Federal Status</i>
Bald eagle	Endangered
Whooping crane	Endangered
Interior least tern	Endangered
Peregrine falcon	Endangered
Arkansas River shiner	Candidate
Arkansas River speckled chub	Candidate
Texas horned lizard	Candidate
White-faced ibis	Candidate
Ferruginous hawk	Candidate
Long-billed curlew	Candidate
Western Snowy plover	Candidate
Prairie mole cricket	Proposed Threatened

#### *Soil Exposure*

There is no controlled access, three (3) workers are on-site, and 12.75 residents within 200 feet from the site (Reference 3). As in all preliminary assessments, soil contamination is assumed. Since the site is located in a long-time urbanized area, it is assumed in this investigation that none of the terrestrial species listed under the surface water pathway are on-site (Reference 23).

#### *Air*

The site is well vegetated and no stressed vegetation has been observed. Additionally, the site is also covered by a large building and an asphaltic parking area. Therefore, an air release is not suspected. The estimated population and wetland acreage within four miles from the site is described below (References 3, 24, 25), and are considered as secondary targets. It is assumed that the habitats of endangered/threatened species listed under the surface water pathway may be within four miles from the site, but not on-site (Reference 3,23).

Distance from site (mi)	Est. Population	Est. Wetland Acreage
On-site	15.75	0
0 - 1/4	492.25	0
1/4 - 1/2	868	0
1/2 - 1	2969	0.5
1 - 2	4933	40.0
2 - 3	26	60.0
3 - 4	263.12	110.0
<b>TOTAL</b>	<b>9567.12</b>	<b>210.5</b>

#### IV. Summary and Conclusion

The Sooner Dial facility operated an aviation instrument dial refurbishing operation between the 1940s and 1969. Enamel paints of radioactive and non-radioactive types, as well as solvents were used in the refurbishing process. The radioactive paint used on-site contained radium, a highly radioactive element which can cause permanent side effects to human and other animal life. The disposal practices at this site were reportedly poor, and radioactivity has been reported as high as 100 times above background levels. A septic system and basement may have been used on-site, therefore, ground water in the vicinity may have been adversely affected. Surface water also has a high potential for contamination due to the likelihood of surface runoff from the site, which poses a threat to the environment and to human targets through food chain contamination. Since no controlled access exists and there are on-site workers as well as nearby workers and residences, human exposure to contaminated soils exists. Due to the site either being covered by well established vegetation and asphalt/pavement, no air release is suspected.

Since abnormally high readings of radioactivity has been measured on-site, and workers and adjacent residences may have been or have the potential to be impacted, it is strongly recommended that this case be referred to the USEPA Emergency Response Branch for immediate remedial action.



**V. Figures**

August 11, 1992

8

Sooner Dial





FIGURE 1. VICINITY MAP

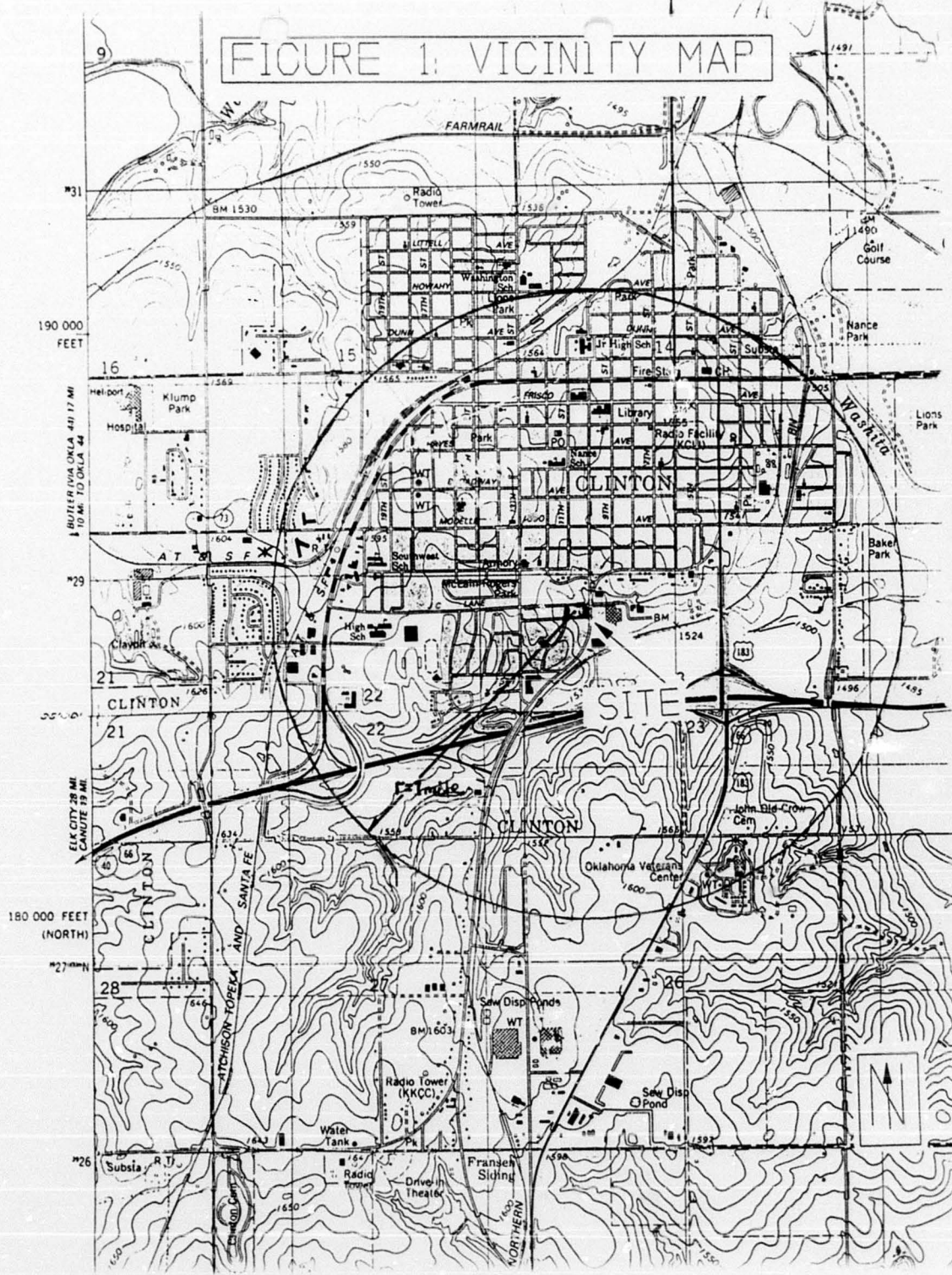


Figure 2 Site Map

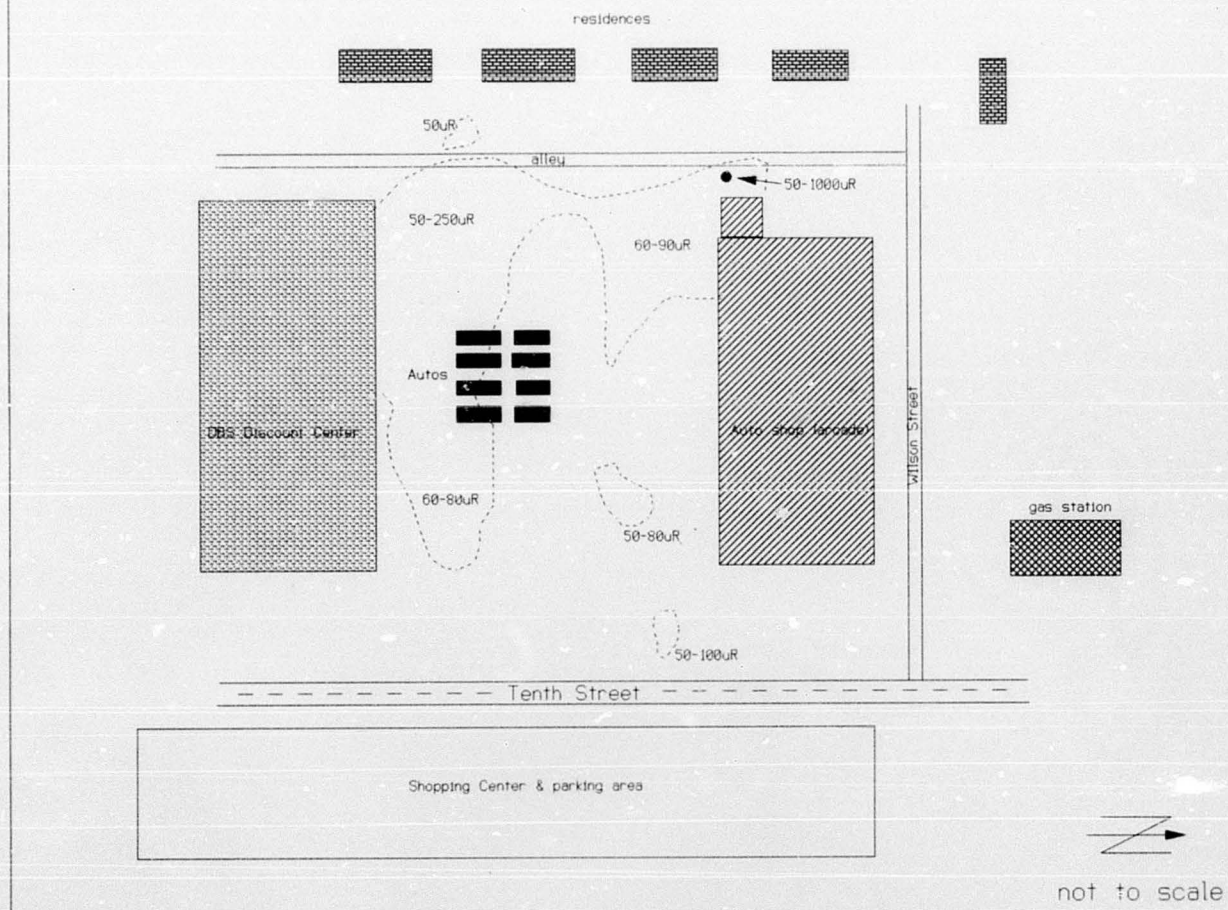


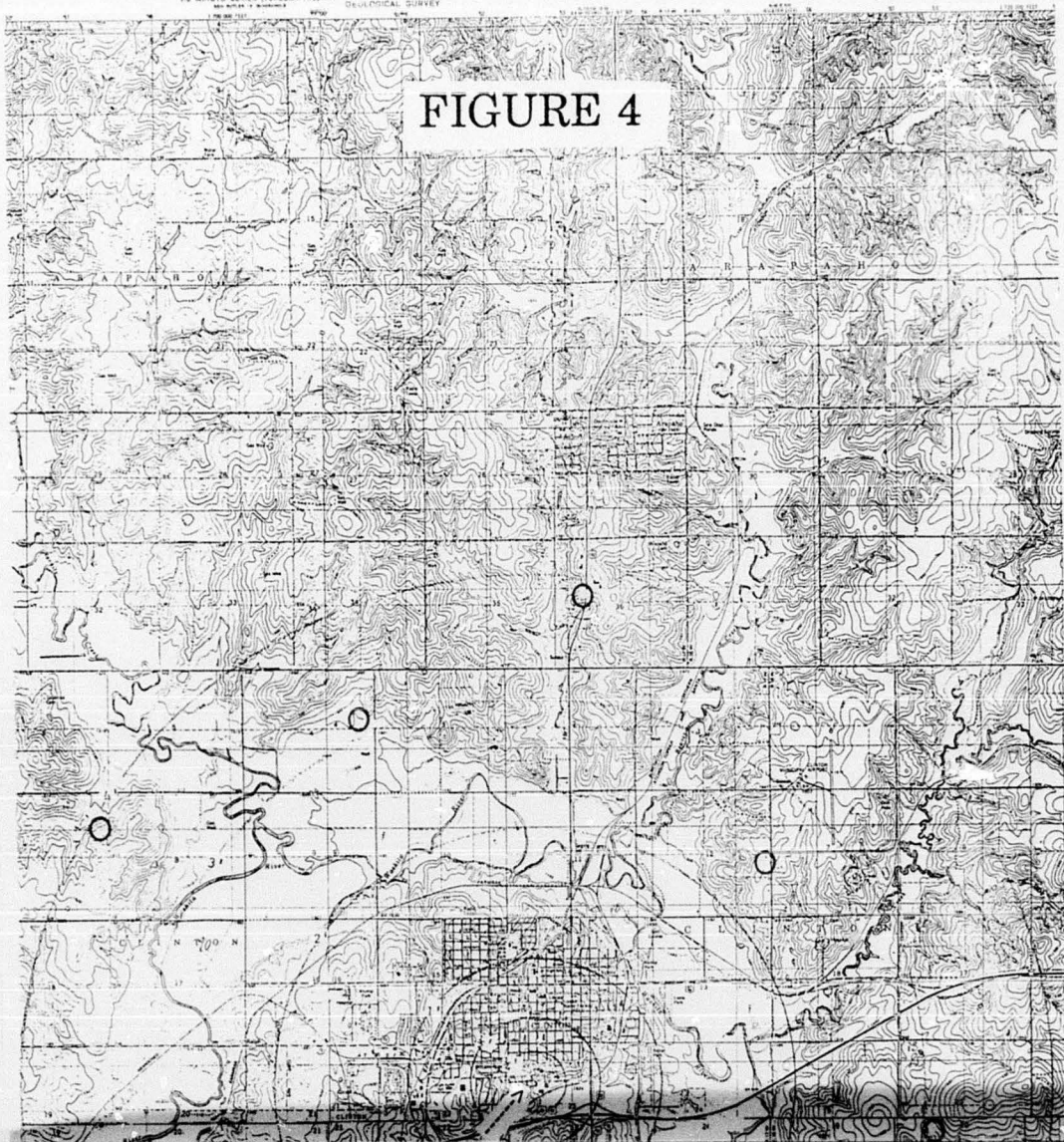


FIGURE 3





FIGURE 4



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100





## VI. Photodocumentation

August 11, 1992

13

Sooner Dial



Photographer: Richard L. Brooks <sup>LAB</sup> Witness: David S. Crow <sup>JSC</sup>  
Date: July 15, 1992 Direction: East



**Comments:** Photograph #1 (matches slide #21, roll 2). Storage area. In this area there are several unmarked 55-gallon drums, batteries, and one (1) 5-gallon solvent container (empty).

August 11, 1992

14

Sooner Dial

Photographer: Richard L. Brooks <sup>RLB</sup> Witness: David S. Crow <sup>WSC</sup>  
Date: June 15, 1992 Direction: East-southeast



**Comments:** Photograph #2 (matches slide #21 roll 1). Western side of auto shop (former Sooner Dial building). In foreground is entrance to alley between site and nearby residences.

August 11, 1992

15

Sooner Dial



Photographer: Richard L. Brooks<sup>ALB</sup> Witness: David S. Crow<sup>DSC</sup>  
Date: June 15, 1992 Direction: North



**Comments:** Photograph #3 (matches slide #4, roll 2). Eastern side of site, and parking lot for active auto shop on-site.

August 11, 1992

16

Sooner Dial

<sup>fab</sup>  
**Photographer:** Richard L. Brooks

**Date:** June 15, 1992

<sup>DSC</sup>  
**Witness:** David S. Crow

**Direction:** West



**Comments:** Photograph #4 (slide #16, roll 1). Fence and backyard area of nearest residence from site.

August 11, 1992

17

Sooner Dial



**Photographer:** Richard L. Brooks

**Date:** June 15, 1992

**Witness:** David S. Crow

**Direction:** East



**Comments:** Photograph #5 (matches slide #19, roll 2). Photo shows front view of nearest residence. Site is immediately behind this residence.

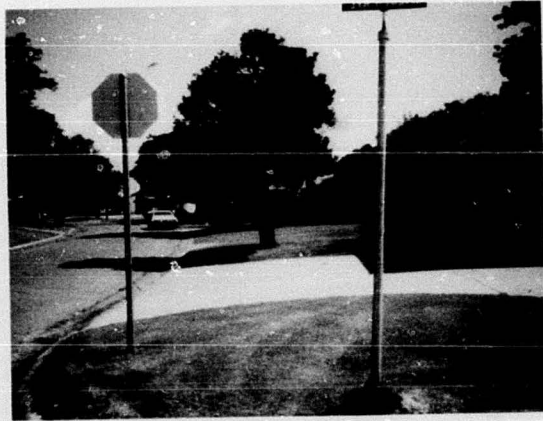
August 11, 1992

18

Sooner Dial

Photographer: Richard L. Brooks <sup>RLB</sup>  
Date: June 15, 1992

Witness: David S. Crow <sup>DSC</sup>  
Direction: South



Comments: Photograph #6 (matches slide #18, roll 2). Photo shows residences immediately to the west of the site.

August 11, 1992

19

Sooner Dial



Photographer: Richard Brooks <sup>RB</sup>  
Date: July 15, 1992

Witness: David Crow <sup>DC</sup>  
Direction: Southeast



Comments: Photograph #7 (matches slide #12, roll 2). Nearby storm water surface drain, which receives surface water runoff from the site.

August 11, 1992

20

Sooner Dial

Photographer: Richard Brooks

Witness: David Crow

Date: July 15, 1992

Direction: West-southwest



Comments: Photograph 8 (matches slide #24, roll 2). This photo shows the general vicinity of the site. The site is the white building seen on the far left of the field of view. Photograph was taken from a "sidewalk mall" shopping center. Immediately behind the site and adjacent businesses is the nearby residences.

August 11, 1992

21

Sooner Dial



Color Slide



**Kodalux**  
PROCESSING SERVICES

Color Slide



**Kodalux**  
PROCESSING SERVICES

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21 Roll #2 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



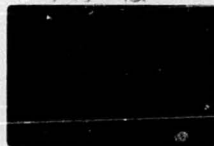
Photographer: Richard Brooks  
Witness: David Crow

22 Roll #1 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



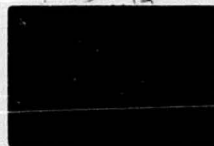
Photographer: Richard Brooks  
Witness: David Crow

4 Roll #2 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



Photographer: Richard Brooks  
Witness: David Crow

16 Roll #1 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



Photographer: Richard Brooks  
Witness: David Crow

19 Roll #2 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



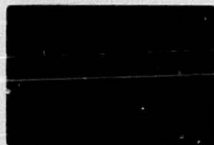
Photographer: Richard Brooks  
Witness: David Crow

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Sinner Dial - Clinton, OK  
7-15-92



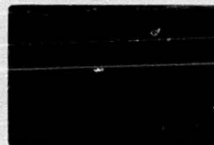
Photographer: Richard Brooks  
Witness: David Crow

24 Roll #2 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



Photographer: Richard Brooks  
Witness: David Crow

17 Roll #2 JUL 9208  
Sinner Dial - Clinton, OK  
7-15-92



Photographer: Richard Brooks  
Witness: David Crow

0

12

5

## VII. List of References

1. U.S. Geological Survey. 15' Quadrangle map of Clinton, Oklahoma 1983.
2. U.S. Environmental Protection Agency. *Standard Operating Procedure to Determine Site Latitude and Longitude Coordinates*. 1991. Calculation Worksheet for the Sooner Dial site, Custer County, OK.
3. David S. Crow, OSDH. *Memorandum: On/Off-site Reconnaissance of the Sooner Dial site, Custer County, OK*. July 16, 1992.
4. U.S. Department of Commerce. *Selected Population and Housing Characteristics: 1990 Custer County, Oklahoma*.
5. David S. Crow, OSDH. *Memorandum: Groundwater targets of the Sooner Dial site, Custer County, OK*. July 7, 1992.
6. R. L. Craig, OSDH. *Memorandum: Sooner Dial Inspection Report*. June 30, 1965.
7. R. L. Craig, OSDH. *Memorandum: Sooner Dial Survey and Sampling Information*. February 13, 1985.
8. J. M. Conlon, OSDH. *Memorandum: Sooner Dial briefing to Dale McHard, OSDH*. December 20, 1966.
9. R. L. Craig, OSDH. *Memorandum: Use of Radium by Aircraft Dial Refurbishing Installations*. August 31, 1965.
10. Clinton Daily Newspaper article. May 14, 1985.
11. Robert L. Craig, OSDH. *Memorandum: Silk screen information pertaining to the Sooner Dial facility*. January 23, 1985.
12. Robert L. Craig, OSDH. *Memorandum: Radium Contamination on Ray Witchert Property*. April 23, 1986.
13. Sax, N. Irving. *Dangerous Properties of Industrial Materials*. 6th edition.
14. Mark S. Schwartz. *Letter to Jimmy D. Givens, OSDH*. April 19, 1991.
15. Dale McHard, OSDH. *Memorandum: Sooner Dial--Additional Investigative Issues*. March 21, 1985.
16. U.S. Department of Agriculture Soil Conservation Service. *Soil Survey of Custer County, Oklahoma*.
17. Oklahoma Geological Survey, Bulletin 114. *Geologic Map of Custer County*. 1984.
18. Oklahoma Geological Survey, Hydrologic Atlas 5, *Reconnaissance of the Water Resources of the Clinton Quadrangle West-Central Oklahoma*. 1976.
19. Oklahoma Geological Survey, *Map showing Bedrock Aquifers and Recharge Areas*. 1983.



20. Richard Brooks, OSDH. *Surface Water Intake Inquiry*. From Gene Dosett, OWRB. May 14, 1992
21. United States Environmental Protection Agency. *Uncontrolled Hazardous Waste Site Ranking System Users Manual*. 1984.
22. Richard Brooks, OSDH. *Flood Potential Inquiry*. From Ken Morris, Oklahoma Water Resources Board. May 14, 1992.
23. U.S. Fish and Wildlife Service. *Oklahoma Federal Listed and Proposed and Candidate Threatened and Endangered Species. Custer and Washita Counties*. June 1990.
24. David S. Crow, OSDH. *Memorandum: Population within study area of the Sooner Dial site, Custer County, OK*. July 7, 1992.
25. Karen Khalafian, OSDH. *Memorandum: Wetland Targets within study area of Sooner Dial site, Custer County, OK*. July 7, 1992.

## VIII. References

August 11, 1992

24

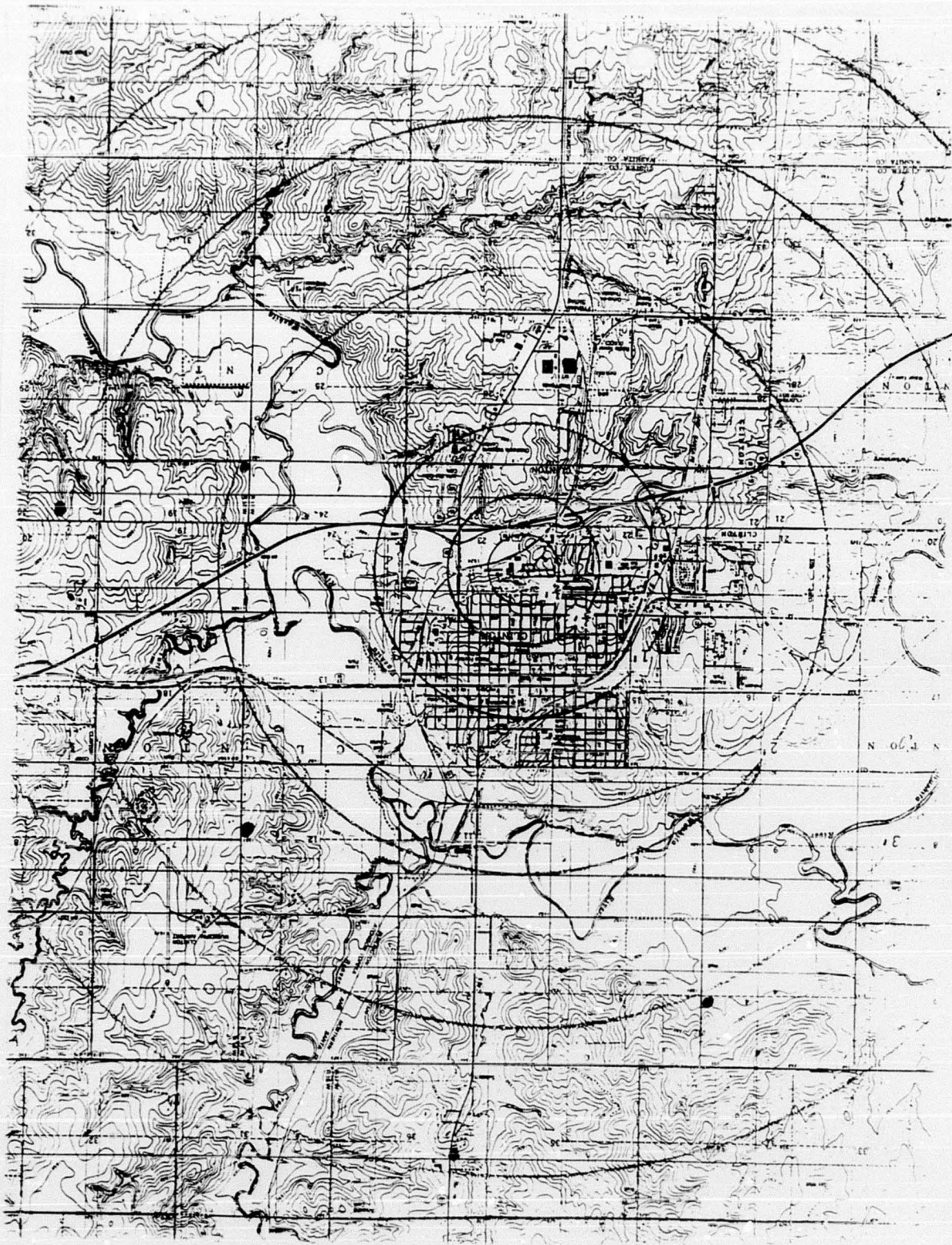
Sooner Dial



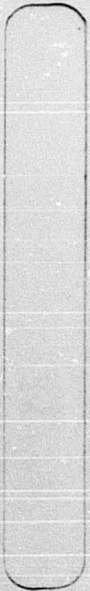
*Reference 1*







*Reference 2*





APPENDIX E

STANDARD OPERATING PROCEDURE  
TO DETERMINE SITE  
LATITUDE AND LONGITUDE COORDINATES

HAZARDOUS SITE EVALUATION DIVISION  
SITE ASSESSMENT BRANCH  
U.S ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C.

September 1991



LATITUDE AND LONGITUDE CALCULATION WORKSHEET #2  
LI USING ENGINEER'S SCALE (1/60)

SITE NAME: Sooner Dist Co CERCLIS #: \_\_\_\_\_

AKA: \_\_\_\_\_ SSID: \_\_\_\_\_

ADDRESS: 1000 South 12th St.

CITY: Clinton STATE: OK ZIP CODE: 73601

SITE REFERENCE POINT: high road corner of the site

USGS QUAD MAP NAME: Clinton TOWNSHIP: 12 N/S RANGE: 17 E/W

SCALE: 1:24,000 MAP DATE: 1983 SECTION: SE 1/4 NW 1/4 NW 1/4 23

MAP DATUM: 1927 1983 (CIRCLE ONE) MERIDIAN: Indian

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 98° 52' 30" LATITUDE: 35° 30' 00"

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 98° 57' 30" LATITUDE: 35° 30' 00"

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM LATITUDE GRID LINE TO SITE REF POINT: 55

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

$$A \times 0.3304 = \underline{18.17}''$$

C) EXPRESS IN MINUTES AND SECONDS (1' = 60''): 00° 18' 17"

D) ADD TO STARTING LATITUDE: 35° 30' 00.00'' + 00° 18' 17'' =

SITE LATITUDE: 35° 30' 18.17''

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) NUMBER OF RULER GRADUATIONS FROM RIGHT LONGITUDE LINE TO SITE REF POINT: 147

B) MULTIPLY (A) BY 0.3304 TO CONVERT TO SECONDS:

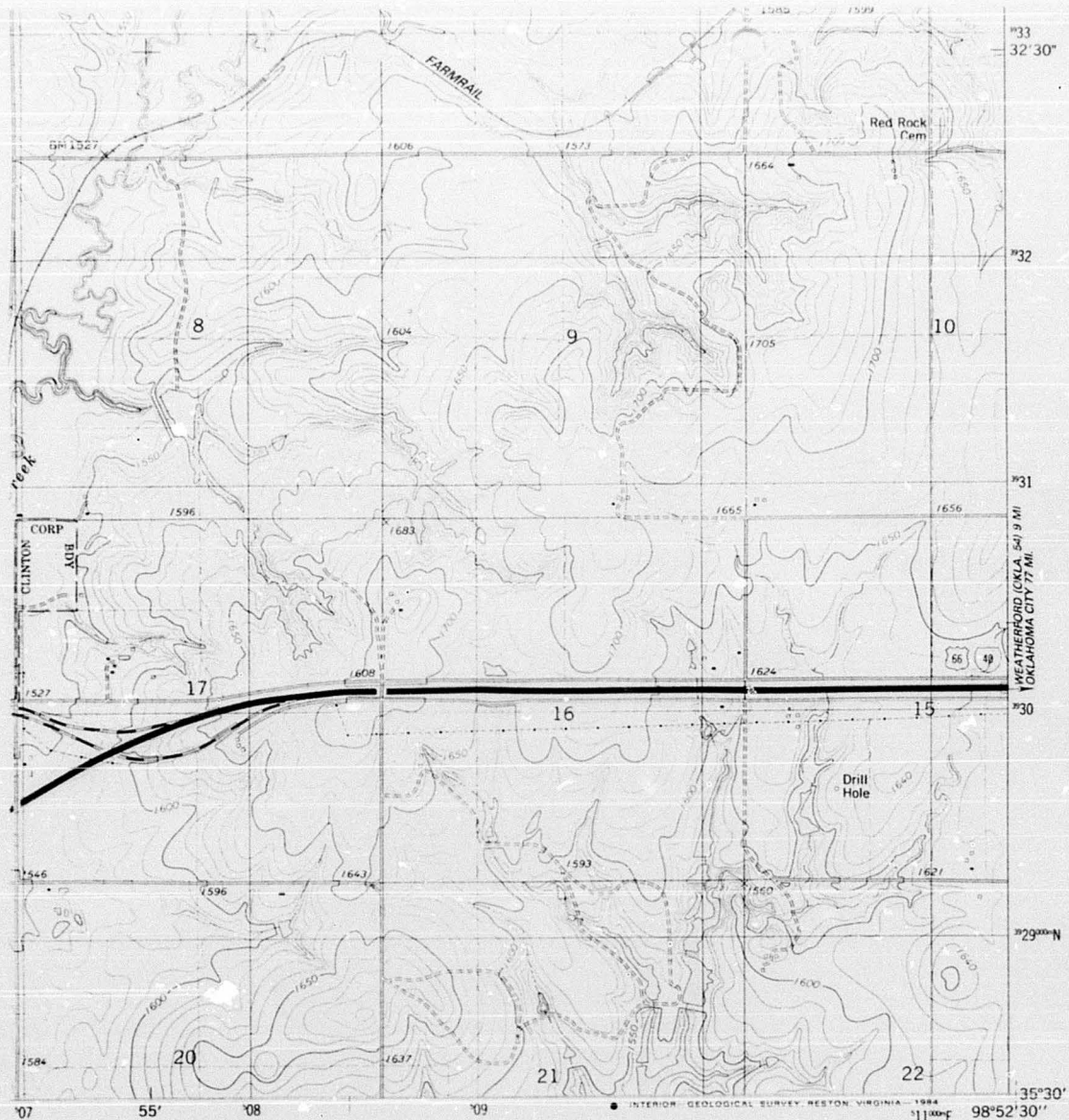
$$A \times 0.3304 = \underline{48.56}''$$

C) EXPRESS IN MINUTES AND SECONDS (1' = 60''): 00° 48' 56"

D) ADD TO STARTING LONGITUDE: 98° 57' 30.00'' + 00° 48' 56'' =

SITE LONGITUDE: 98° 58' 18.56''

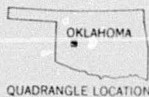
INVESTIGATOR: Karen Khalafian DATE: 05.05.92



1 MILE

10 FEET

TER



QUADRANGLE LOCATION

IRGINIA 22092

JEST

#### ROAD CLASSIFICATION

Primary highway hard surface ——— Light-duty road, hard or improved surface ———  
 Secondary highway, hard surface ——— Unimproved road ———  
 ○ Interstate Route ○ U. S. Route ○ State Route

CLINTON, OKLA.

SW/4 CLINTON 15' QUADRANGLE  
 N3530-W9852.5/7.5

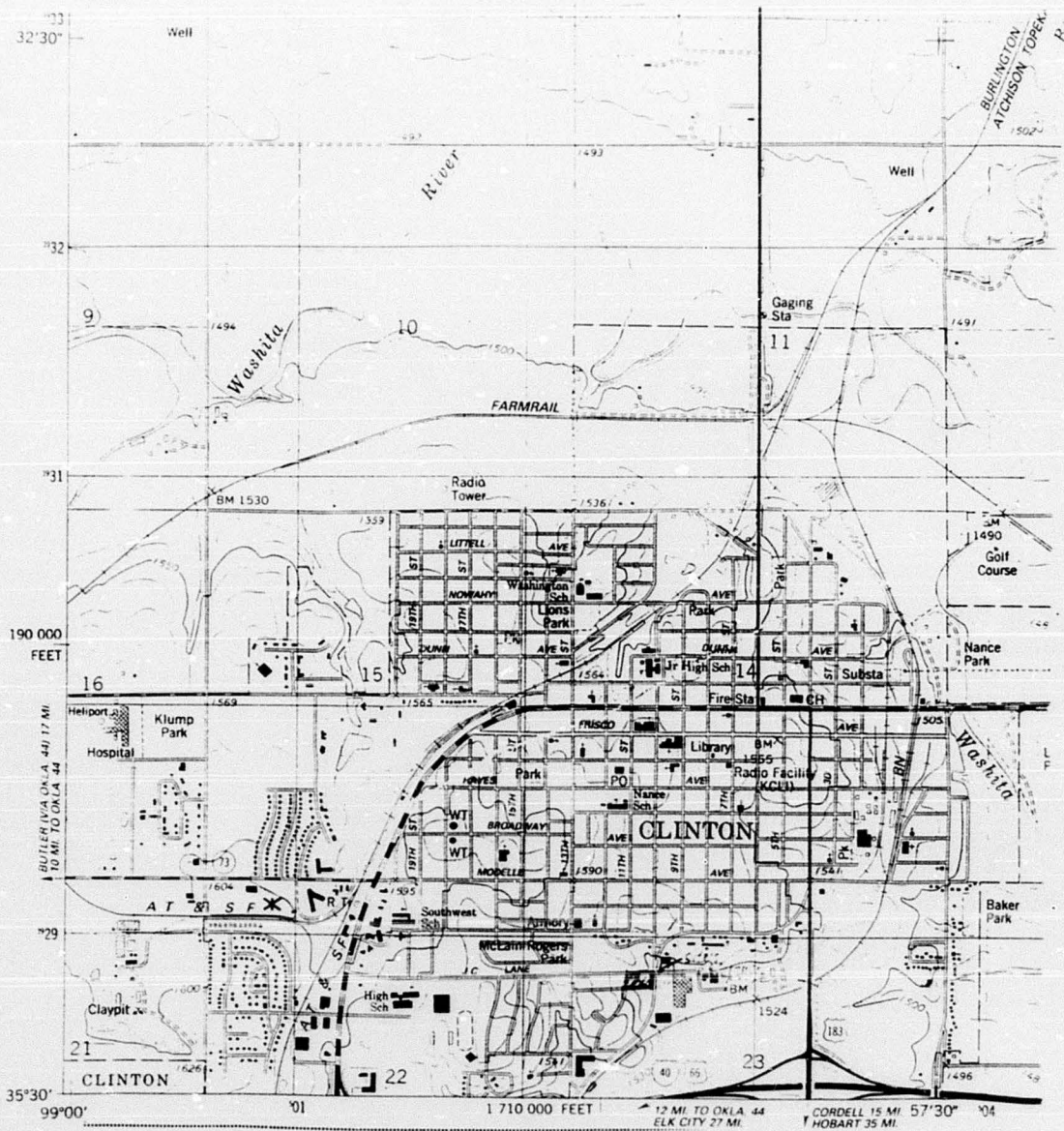
1983

DMA 6253 III SW-SERIES V883

(CORN)  
 6253 IV NE



NUMBER:



TOPOGRAPHIC MAP QUADRANGLE NAME:

SCALE: 1:24,000

COORDINATES OF LOWER RIGHT-HAND CORNER OF 2.5-MINUTE GRID:

LATITUDE: 20° 20' N LONGITUDE: 160° 00' W

• U S GOVERNMENT PRINTING OFFICE: 1991-548-10740508


E-11



*Reference 3*



## MEMORANDUM

**To:** Sooner Dial PA file  
**From:** David S. Crow, OSDH   
**Re:** Sooner Dial/Raymond Wichert on/off-site reconnaissance  
**Date:** July 16, 1992

On July 15, 1992, the following OSDH officials traveled to Clinton, Oklahoma for the purpose of conducting an on/off-site reconnaissance of the Sooner Dial site and the Raymond Wichert site; Richard Brooks, Gary Ammon, David Crow, and Tim Daly. We arrived in Clinton at approximately 9:00 a.m., and first stopped at the County Health Department to meet with Beth Ledbetter, county sanitarian.

Next, the five of us drove to the Sooner Dial site. On-site is "Miller's Auto Shop", an active auto body. This building is the former arcade, which is a former Sooner Dial facility building. According to the owner of the auto shop, Buddy Miller, there are two (2) full-time workers and two (2) part-time workers on-site. The building consist of concrete brick walls and a concrete slab floor. Wastes that are generate by the auto shop, such as paint waste, thinners, and carburetor cleaners are taken to Mike's Body Shop and collected by the appropriate companies. Waste oil is collected in drums and "picked up by an Oklahoma City firm". However, just outside the shop is six (6) 55 gallon drums, a 5 gallon container of carburetor cleaner, and ten (10) old automobile batteries. Miller's Auto Shop telephone number is (405) 323-0278.

The remainder of the site is a vacant lot, where another Sooner Dial building was once located, but since has been demolished. This vacant lot is located south of the auto shop building. The vacant lot is mostly a grass area with some areas covered with asphalt. No stressed vegetation was observed during the reconnaissance. According to Gary Ammon, underlying the vacant lot appears to be a concrete slab and possibly a basement. In the area of this covered concrete slab, Gary measured over 50 micro R/hour of radioactivity where background in the area is 8-9 micro R/hour. There is no controlled access of any kind in regards to the site, and is about 1/4 of an acre in size. Gary Ammon informed me that the Sooner Dial began operation in the 1940s and ceased operation in 1969.

Just south of the site is DBS Discount Center. According to an employee, Connie Robertson, there is one (1) full-time worker, and one (1) part-time worker. Also, approximately ten (10) patrons per day come into the discount center. In addition, there are at least five (5) homes within 200 feet of the site. Three of these homes back up to the Sooner Dial site. The address to the nearest resident is 1005 Circle Drive. Within 700 feet to the north of the site is a community park, putt-putt golf course, and a municipal swimming pool.



The site sits in a somewhat low area with hills on three sides. Drainage coming from the residence adjacent to the site, from the west, would flow over the site and then drain to the south east under Wilson Street.

Following our reconnaissance of the Sooner Dial site, we drove to the Wichert dump site where Sooner Dial rubble was allegedly dumped. Here another site reconnaissance was performed and is to be included in another Preliminary Assessment currently being composed. Following the Wichert reconnaissance, the five of us returned to the Custer County Health Department. Ms. Ledbetter asked us questions in regards to what was going to be done now that a reconnaissance had been conducted. Before leaving, I told her I would mail her a copy of the completed preliminary assessment. Photographs of pertinent subjects were taken during the on/off-site reconnaissance.



*Reference 4*



Table 1. Selected Population and Housing Characteristics: 1990  
Custer County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	26,897	Total housing units	11,636
SEX		OCCUPANCY AND TENURE	
Male	13,131	Occupied housing units	9,918
Female	13,766	Owner occupied	6,293
		Percent owner occupied	63.5
AGE		Renter occupied	3,625
Under 5 years	1,924	Vacant housing units	1,718
5 to 17 years	5,191	For seasonal, recreational, or occasional use	180
18 to 20 years	2,204	Homeowner vacancy rate (percent)	3.3
21 to 24 years	2,184	Rental vacancy rate (percent)	13.5
25 to 44 years	7,446		
45 to 54 years	2,353	Persons per owner-occupied unit	2.61
55 to 59 years	1,032	Persons per renter-occupied unit	2.46
60 to 64 years	975	Units with over 1 person per room	389
65 to 74 years	1,801		
75 to 84 years	1,338	UNITS IN STRUCTURE	
85 years and over	449	1-unit, detached	8,102
Median age	29.7	1-unit, attached	198
Under 18 years	7,115	2 to 4 units	803
Percent of total population	26.5	5 to 9 units	455
65 years and over	3,588	10 or more units	560
Percent of total population	13.3	Mobile home, trailer, other	1,518
HOUSEHOLDS BY TYPE		VALUE	
Total households	9,918	Specified owner-occupied units	4,691
Family households (families)	6,851	Less than \$50,000	2,503
Married-couple families	5,693	\$50,000 to \$99,999	1,842
Percent of total households	57.4	\$100,000 to \$149,999	251
Other family, male householder	275	\$150,000 to \$199,999	61
Other family, female householder	883	\$200,000 to \$299,999	30
Nonfamily households	3,067	\$300,000 or more	4
Percent of total households	30.9	Median (dollars)	46,900
Householder living alone	2,519	CONTRACT RENT	
Householder 65 years and over	1,016	Specified renter-occupied units	
Persons living in households	25,333	paying cash rent	3,217
Persons per household	2.55	Less than \$250	2,116
GROUP QUARTERS		\$250 to \$499	1,061
Persons living in group quarters	1,564	\$500 to \$749	36
Institutionalized persons	576	\$750 to \$999	3
Other persons in group quarters	988	\$1,000 or more	1
		Median (dollars)	219
RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
White	22,896	Occupied housing units	9,918
Black	930	White	8,849
Percent of total population	3.5	Black	292
American Indian, Eskimo, or Aleut	1,660	Percent of occupied units	2.9
Percent of total population	6.2	American Indian, Eskimo, or Aleut	407
Asian or Pacific Islander	169	Percent of occupied units	4.1
Percent of total population	0.6	Asian or Pacific Islander	44
Other race	1,242	Percent of occupied units	0.4
Hispanic origin (of any race)	1,625	Other race	326
Percent of total population	6.0	Hispanic origin (of any race)	400
		Percent of occupied units	4.0

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

*Reference 5*

0

2

7

2



# Memorandum

July 7, 1992

To: Sooner Dial Pa File

From: David S. Crow, OSDH | *DC*

Re: Groundwater targets within study area.

The following table represents the population served by public and private wells within the study radius. According to available well logs, there are no public water wells within the Sooner Dial site's study radius. Per the 1990 Census data, the number of persons per household in Custer County is 2.55. The number of persons served by private wells within each study radii is based on the following calculation: **number of persons per household X number of private wells within the appropriate radii.**

This memorandum will be used as a source of reference for the groundwater section of the preliminary assessment.

Distance from site (mi)	Estimated Population Served By:	
	Private Wells	Public Wells
On-site	0	0
0 - 1/4	0	0
1/4 - 1/2	0	0
1/2 - 1	0	0
1 - 2	2.55	0
2 - 3	2.55	0
3 - 4	10.2	0
Total	15.3	0

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Custer County, Oklahoma

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RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN	
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Percent of total population	6.0	Other race	326
		Hispanic origin (of any race)	400
		Percent of occupied units	4.0

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.



White - Water Resources Board  
Canary - Drillers Copy  
Pink - Drillers Copy

STATE OF OKLAHOMA  
WATER RESOURCES BOARD  
1000 N E 10th St. P O Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_  
(Official Use Only)

MULTI-PURPOSE WATER WELL REPORT

1. OWNER TIM DAVIS ADDRESS CLINTON, OKLA 73601

2. LEGAL DESCRIPTION OF WELL

SE 1/4 of SE 1/4 of NE 1/4 of sec. 4 : TWP. 12 N S; Rge. 17 EIM  
ECM: COUNTY CUSTER

3. TYPE OF WORK

☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other

6. LOG

Material	From	To	Saturated
SOIL	0	15	✓
SHALE	15	120	
SANDSTONE	120	160	
W/SHALE STREAKS	160	185	
SANDSTONE			

7. NEW WELL CONSTRUCTION DATA

Dates: Started 6-4-85 Completed 6-10-85  
Contractor W.L. MYERS DRILLING CO. INC.  
Driller W.L. MYERS  
Diameter Hole 8 in. Total Depth 185 ft.

CASING RECORD

Diameter From To  
5 PVC in. 0 ft. 185 ft.  
Surface Seal: ☒ Yes ☐ No Type: CEMENT  
Depth of Seal: 10 ft.  
Gravel Packed:  
Gravel Packed From 10 ft. to 185 ft.  
Amount Used: 2 TON

PERFORATION RECORD

Type SLOT From 145 ft. To 185 ft.  
Size 10 From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
" \_\_\_\_\_ From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.

8. WELL TEST DATA

Static Water Level Below Land Surface 35 ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C/F Quality \_\_\_\_\_

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 103 ft. After Pumping 24 hrs. At 17 gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

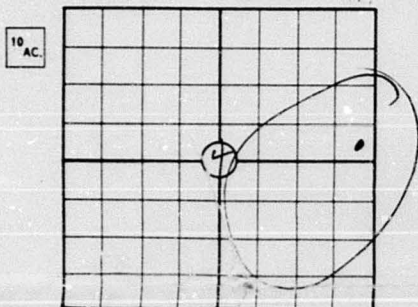
Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

13. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name W.L. MYERS License # WD-24  
Address RT 3 CLINTON OKLA 73601 Phone # 323-2782  
Signed W.L. MYERS Date 7-19-85

11. PLAT



SE 1/4 of SE 1/4 of NE 1/4 of SEC 4 :  
TWP. 12 N S; RGE. 17 EIM, WIM, ECM

12. PUMP INFORMATION

Pump Type SUB  
Power Source ELECTRIC  
Rated Capacity 10 gpm.  
Depth of Bowls or Cylinder 150 ft.



# 25372

1. WELL OWNER RILEY CABANISS PHONE                       
2. LEGAL DESCRIPTION NE 1/4 of SE 1/4 of NE 1/4 of sec. 7 TWP. 12 N. RGE. 17 E. CM. COUNTY CLUSTER

FINDING LOCATION

Blocks or distance(s) from given point(s)

3. TYPE OF WORK <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Reconditioning Work <input type="checkbox"/> Test/Monitoring <input type="checkbox"/> G.W. Heat Pump <input type="checkbox"/> Other	4. USE <input checked="" type="checkbox"/> Domestic <input checked="" type="checkbox"/> Stock <input type="checkbox"/> Test/Monitoring <input type="checkbox"/> G.W. Heat Pump <input type="checkbox"/> Other	NON-DOMESTIC <input type="checkbox"/> Irrigation <input type="checkbox"/> Municipal <input type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Other	5. DRILLING METHOD <input checked="" type="checkbox"/> Fluid Rotary <input type="checkbox"/> Cable <input type="checkbox"/> Air Rotary <input type="checkbox"/> H.S. Auger <input type="checkbox"/> Rev. Rotary <input type="checkbox"/> Other
--	--	---	--

6. LITHOLOGIC LOG

Material	From	To	Saturated
Top soil	0	10'	
Clay + shale strata	10'	80'	
+ gypsum	80'	85'	
Shale	85'	132'	
Gypsum	132'	139'	
Shale	139'	200'	
Clay	200'	240'	
Gypsum	240'	245'	
Shale	245'	295'	
Sandstone	295'	350'	

7. LOCATION PERMIT

If this well is Non-Domestic, has the location been permitted?

☐ Yes ☐ No Permit No.                     

8. NEW WELL CONSTRUCTION DATA

DATES: Started 8/17/90 Completed 8/19/90  
Contractor W.L. MYERS DRILLING CO. INC  
Driller W.L. MYERS  
Diameter Hole 8 in. Total Depth 350 ft.

CASING RECORD

Diameter                      in. From                      ft. To                      ft.  
Surface Pipe NONE in.                      ft.                      ft.  
Well Casing 5" PVC in. 0 ft. 350 ft.  
Cement Grout Surface Seal? ☒ Yes ☐ No  
Type of Surface Seal: CEMENT Depth of Seal: 15 ft.  
GRAVEL PACK:  
Gravel Packed From 350 ft. to 15 ft.  
Amount Used: 2 TON

PERFORATION RECORD

Type/Size 5" PVC From 291 ft. To 350 ft.  
From                      ft. To                      ft.  
From                      ft. To                      ft.

9. WELL TEST DATA

Static Water Level 80 ft.  
Below Land Surface                      ft.  
Approximate Yield 15 gpm.  
If Artesian: Flows                      gpm.

10. PUMP INFORMATION

Pump Type SUBMERSIBLE  
Power Source ELECTRIC  
Rated Capacity 10 gpm.  
Depth of Bowls or Cylinder 180 ft.

11. PLUGGING DATA

Date Plugged                       
Backfilled With                      Material To                      ft.  
Grouted or Cemented From                      Ft. To                      ft.

12. RECONDITIONING WORK

Date Completed                       
Replaced Casing From                      ft. To                      ft.  
Replaced Screen From                      ft. To                      ft.  
Deepened Well From                      ft. To                      ft.  
Redeveloped Well By                     

14. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

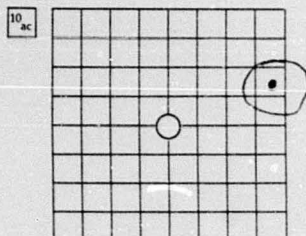
Name W.L. MYERS DRILLING CO. INC License # W.D. 24  
Address AT 3 CLINTON, OKLA Phone # 323 2789  
Signed W.L. Myers Date 8/18/91

RECEIVED

JUL 8 1991

OKLA. WATER RESOURCES BOARD

13. PLAT



White — Water Resources Board  
Canary — Drillers Copy  
Pink — Drillers Copy

STATE OF OKLAHOMA  
WATER RESOURCES BOARD  
1000 N.E. 10th St., P.O. Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_  
(Official Use Only)

MULTI-PURPOSE WATER WELL REPORT

1. OWNER ALBERT E. PECK ADDRESS Rt 4, Box 240, Clinton, Ok 73601

2. LEGAL DESCRIPTION OF WELL

SE  $\frac{1}{4}$  of NW  $\frac{1}{4}$  of SW  $\frac{1}{4}$  of sec. 20, TWP. 12 N 16 S, Rge. 16 ~~XXX~~ COUNTY CUSTER

3. TYPE OF WORK

☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other \_\_\_\_\_

6. LOG

Material	From	To	Satur. rated
Soil	0	5	
Sand	5	55	
Shale	55	65	
Shale & Clay	65	90	
Shale	90	115	
Shale & Sand	115	160	
Sand	160	165	
Shale & Sand	165	300	
Mostly Sand	300	400	

7. NEW WELL CONSTRUCTION DATA

Dates: Started 2-22-84 Completed 2-22-84  
Contractor Ainsworth Oilfield Equip., Inc.  
Driller A. Ainsworth  
Diameter Hole 9-7/8 in. Total Depth 440 ft.

CASING RECORD

Diameter From To  
6" PVC in. 0 ft. 440 ft.  
in. ft. ft.

Surface Seal: ☐ Yes ☐ No Type: \_\_\_\_\_  
Depth of Seal: 10 ft.  
Gravel Packed:  
Gravel Packed From 12 ft. to 440 ft.  
Amount Used: \_\_\_\_\_

PERFORATION RECORD

Type 6" PVC From 420 ft. To 380 ft.  
Size 6" PVC From 360 ft. To 260 ft.  
" 6" PVC From 240 ft. To 200 ft.

8. WELL TEST DATA

Static Water Level Below Land Surface \_\_\_\_\_ ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C/F Quality \_\_\_\_\_

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 80 ft. After Pumping 4 hrs. At \_\_\_\_\_ gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

13. CERTIFICATION

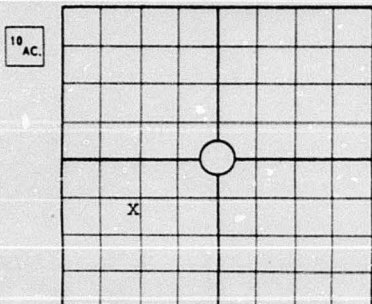
The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name A. Ainsworth License # WD-193  
Address Rt 2 Box 33, Cordell, Ok Phone # 674-3339  
Signed A. Ainsworth Date 3-05-84

RECEIVED  
MAR 15 1984

Oklahoma Water Resources Board

11. PLAT



SE  $\frac{1}{4}$  of NW  $\frac{1}{4}$  of SW  $\frac{1}{4}$  of SEC 20,  
TWP. 12 N 16 S, RGE. 16 ~~XXX~~ WIM, ~~XXX~~

12. PUMP INFORMATION

Pump Type \_\_\_\_\_  
Power Source \_\_\_\_\_  
Rated Capacity \_\_\_\_\_ gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.



White — Water Resources Board  
Canary — Drillers Copy  
Pink — Drillers Copy

DECEIVED

STATE OF OKLAHOMA  
WATER RESOURCES BOARD

1800 N.E. 10th St., P.O. Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_

(Official Use Only)

MULTI-PURPOSE WATER WELL REPORT

Oklahoma Water Resources Board

Niv

1. OWNER Bill Price ADDRESS P.O. Box 187, Hattanooga, OK  
73712 PHONE \_\_\_\_\_

2. LEGAL DESCRIPTION OF WELL

CQU 1/4 of SW 1/4 of SW 1/4 of sec. 19, TWP. 12 S. Rge. 16 EIM WIM COUNTY Custer

3. TYPE OF WORK

☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other \_\_\_\_\_

6. LOG 7. NEW WELL CONSTRUCTION DATA

Material	From	To	Saturated
Top Soil + fine Sand	0	35	
Sand med. to coarse	35	60	
Soft Sand rock	60	72	
Sand rock w/ hard soft layers	72	140	

Dates: Started 3-7-84 Completed 3-7-84  
Contractor Edbank, Inc  
Driller \_\_\_\_\_  
Diameter Hole 7 7/8 in. Total Depth 140 ft.

CASING RECORD

Diameter 4 1/2 in. From 0 ft. To 140 ft.  
Surface Seal: ☒ Yes ☐ No Type: Cement  
Depth of Seal: 11 ft.  
Gravel Packed: yes  
Gravel Packed From 11 ft. to 140 ft.  
Amount Used: 1 1/2 yds

PERFORATION RECORD

Type PK Perc From 70 ft. To 140 ft.  
Size \_\_\_\_\_ From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
" \_\_\_\_\_ From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.

8. WELL TEST DATA

Static Water Level Below Land Surface 60 ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C/F Quality \_\_\_\_\_

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 90 ft. After Pumping 2 hrs. At 10 gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

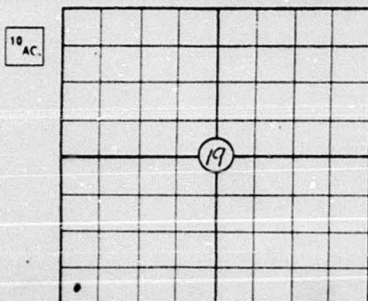
Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

13. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name Water Well Drilling License # WD-9  
Address 601 South Main Phone # \_\_\_\_\_  
Fairview, Oklahoma  
Signed \_\_\_\_\_ Date \_\_\_\_\_

11. PLAT



SW 1/4 of SW 1/4 of SW 1/4 of SEC 19

TWP 12 S. RGE 16 EIM WIM ECM

12. PUMP INFORMATION

Pump Type \_\_\_\_\_  
Power Source \_\_\_\_\_  
Rated Capacity \_\_\_\_\_ gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.



White — Water Resources Board  
Canary — Drillers Copy  
Pink — Drillers Copy

STATE OF OKLAHOMA  
WATER RESOURCES BOARD  
1000 N E 10th St. P.O. Box 53585  
Oklahoma City, Oklahoma 73152

Application No. \_\_\_\_\_  
Aquifer \_\_\_\_\_  
Steam System Code \_\_\_\_\_  
Use Code \_\_\_\_\_  
County \_\_\_\_\_  
(Official Use Only)

#20345

MULTI PURPOSE WATER WELL REPORT

1. OWNER Fred Kuyper ADDRESS NE of CITY  
CLINTON, OKLA 73601 PHONE 323-0600  
2. LEGAL DESCRIPTION OF WELL EIM  
WIM  
NE 1/4 of NE 1/4 of SE 1/4 of sec. 12; TWP. 12 N S: Rge. 17 ECM: COUNTY CUSTER

3. TYPE OF WORK

☒ New Well ☐ Plugging  
☐ Reconditioning Work ☐ Test

4. PROPOSED / PAST USE

☒ Domestic ☐ Irrigation ☐ Stock  
☐ Municipal ☐ Industrial ☐ Test

5. DRILLING METHOD

☒ Rotary ☐ Rev. Rotary  
☐ Cable ☐ Other \_\_\_\_\_

6. LOG

Material	From	To	Natu raled
TOP SOIL	0	5	
CLAY	5	100	
SHALE	100	180	
GYPSON	180	185	
SANDSTONE	185	200	

7. NEW WELL CONSTRUCTION DATA

Dates: Started AUG 8 '83 Completed AUG 12 '83  
Contractor MYERS DRILLING CO INC  
Driller W.L. MYERS  
Diameter Hole 8 in. Total Depth 200 ft.

CASING RECORD

Diameter From To  
5 in. 0 ft. 200 ft.  
in. ft.  
Surface Seal: ☒ Yes ☐ No Type: CEMENT  
Depth of Seal: 10 ft.  
Gravel Packed:  
Gravel Packed From 10 ft. to 200 ft.  
Amount Used: 4 TONS

PERFORATION RECORD

Type SLIT From 160 ft. To 200 ft.  
Size 5" From 160 ft. To 200 ft.  
" From ft. To ft.

8. WELL TEST DATA

Static Water Level Below Land Surface 80 ft.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Water Temp. \_\_\_\_\_ °C/F Quality HARD GYPSON

BAILER TEST

Drawdown \_\_\_\_\_ ft. After Pumping \_\_\_\_\_ hrs. At \_\_\_\_\_ gpm.  
Size of Bailer: \_\_\_\_\_ gal.

PUMPING TEST

Drawdown 70 ft. After Pumping 10 hrs. At 10 gpm.

9. PLUGGING DATA

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Plot Location in Item 11. Show Distances From 2 Section Lines.

10. RECONDITIONING WORK

Date Completed \_\_\_\_\_  
☐ Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
☐ Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

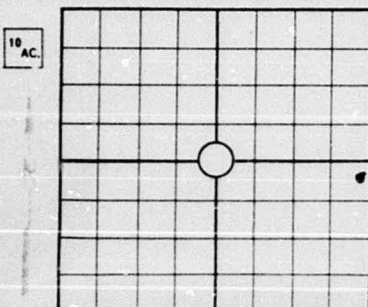
13. CERTIFICATION

The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name W.L. MYERS License # WD-24  
Address RT 3 BOX 8 CLINTON OK. 73601 Phone # 323-2789

Signed \_\_\_\_\_ Date \_\_\_\_\_

11. PLAT



NE 1/4 of NE 1/4 of SE 1/4 of SEC 12  
N  
TWP 12 S: RGE 17 EIM, WIM, ECM

12. PUMP INFORMATION

Pump Type CYLINDER  
Power Source WIND  
Rated Capacity 5 gpm.  
Depth of Bowls or Cylinder \_\_\_\_\_ ft.

STATE OF OKLAHOMA  
**MULTI-PURPOSE WATER WELL REPORT**  
OKLAHOMA WATER RESOURCES BOARD  
1000 N.E. 10th St., P.O. Box 53585  
Oklahoma City, Oklahoma 73152

# 20470

1. WELL OWNER Lee LEE GOUCHER PHONE 323-2217  
2. LEGAL DESCRIPTION SE  $\frac{1}{4}$  of SW  $\frac{1}{4}$  of NE  $\frac{1}{4}$  of sec. 36, TWP. 13 N, S. RGE. 17 E, CM. COUNTY CUSTER

FINDING LOCATION

Blocks or distance(s) from given point(s).

<b>3. TYPE OF WORK</b> <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Reconditioning Work <input type="checkbox"/> Test/Monitoring <input type="checkbox"/> G.W. Heat Pump <input type="checkbox"/> Other _____	<input type="checkbox"/> Plugging	<b>4. USE</b> <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Stock <input type="checkbox"/> Test/Monitoring <input type="checkbox"/> G.W. Heat Pump <input type="checkbox"/> Other _____	<b>NON-DOMESTIC</b> <input type="checkbox"/> Irrigation <input type="checkbox"/> Municipal <input type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Other _____	<b>5. DRILLING METHOD</b> <input checked="" type="checkbox"/> Fluid Rotary <input type="checkbox"/> Cable <input type="checkbox"/> Air Rotary <input type="checkbox"/> H.S. Auger <input type="checkbox"/> Rev. Rotary <input type="checkbox"/> Other _____
---	-----------------------------------	--	--	---

**6. LITHOLOGIC LOG** **7. LOCATION PERMIT**

Material	From	To	Saturated
Top Soil	0	to 5'	
Gypsum	5	- 10	
Shale	10	- 100	
CLAY	100	- 120	
Gypsum	120	- 128	
CLAY	128	- 200	
SANDSTONE	200	- 220	

If this well is Non-Domestic, has the location been permitted?  
☐ Yes ☐ No Permit No. \_\_\_\_\_

**8. NEW WELL CONSTRUCTION DATA**

DATES: Started MARCH 10 Completed MAY 12, 1987  
Contractor MYERS DRILLING CO  
Driller W. L. MYERS  
Diameter Hole 8" in. Total Depth 220' ft.

**CASING RECORD**  
Diameter From To  
Surface Pipe \_\_\_\_\_ in. \_\_\_\_\_ ft. \_\_\_\_\_ ft.  
Well Casing 5" PVC in. 12 ft. 220 ft.  
Cement Grout Surface Seal? ☒ Yes ☐ No  
Type of Surface Seal: CEMENT Depth of Seal: 11 ft.  
**GRAVEL PACK:**  
Gravel Packed From 11 ft. to 220 ft.  
Amount Used: 2 3/4 TONS

**PERFORATION RECORD**  
Type/Size From To  
FACTORY SLOT From 200 ft. To 220 ft.  
From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.

**9. WELL TEST DATA** **10. PUMP INFORMATION**

Static Water Level \_\_\_\_\_  
Below Land Surface 75 ft.  
Approximate Yield 15 gpm.  
If Artesian: Flows \_\_\_\_\_ gpm.  
Pump Type SUBMERSIBLE  
Power Source ELECTRIC  
Rated Capacity 10 gpm.  
Depth of Bowls or Cylinder 160 ft.

**11. PLUGGING DATA**

Date Plugged \_\_\_\_\_  
Backfilled With \_\_\_\_\_ Material To \_\_\_\_\_ ft.  
Grouted or Cemented From \_\_\_\_\_ Ft. To \_\_\_\_\_ ft.

**12. RECONDITIONING WORK**

Date Completed \_\_\_\_\_  
Replaced Casing From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Replaced Screen From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Deepened Well From \_\_\_\_\_ ft. To \_\_\_\_\_ ft.  
Redeveloped Well By \_\_\_\_\_

**13. CERTIFICATION**

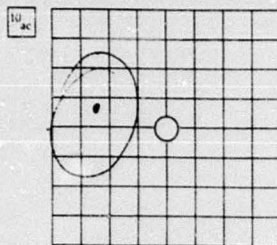
The work described above was done under my supervision, and this report is true and correct to the best of my knowledge.

Name W. L. MYERS License # W024  
Address RT 3 CLINTON, OKLA 73601 Phone # 323-2789  
Signed W. L. Myers Date 4-10-89

RECEIVED

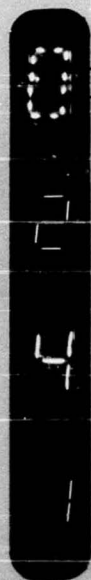
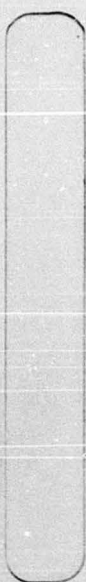
NOV 1 1989

OKLA. WATER RESOURCES BOARD





Reference 6



Licensee: Sooner Dial Company

Address: 1002 South 10th Street  
Clinton, Oklahoma

Radiation Safety Officer

Harold C. Bay.

People Talked to in Course of Inspection

Harold C. Bay and Charles E. Owens, General Manager.

Information about User Organization

This company is engaged in the refinishing of aircraft instrument dials with radioactive and nonradioactive paint. Many of the dials which are returned for refinishing have been painted with radioactive paint in the past. These are opened in the front office by the secretary, transferred to the shop, where they are stored awaiting processing, and the old paint is stripped in a pot containing a solvent. The dial is then refinished using the appropriate paint as required.

Inventory of Radioactive Material

At the time of inspection, there was on hand 3 vials of paint containing approximately 0.3 millicuries of radium each.

Use Made of Material

This radium paint is used in the painting of aircraft instrument dials.

Personnel Monitoring Devices

None.

Personnel Exposures

Personnel exposure could not be determined since no personnel monitoring devices were in use.

Survey Instruments

None.

Survey Procedures

None.

Safety Procedures and Emergency Plan

None.

Leak Testing

Not required since these sources are not sealed.



#### Storage Facilities

The radium paint is stored in a lead-box underneath a work bench. There are also stored many empty vials which had contained radium paint in the past. These vials are stored underneath a work bench.

#### Posting

None.

#### Results of Inspector's Survey

It was found that the work area was grossly contaminated with radium paint. All areas in the shop were contaminated with levels from 7500 to 300,000 counts per minute of alpha radiation as measured with the PAC 1SA. Five wipe samples were taken in areas which were surveyed directly. All of the wipes showed removable contamination from 460 to 42,778 dpm per 100<sup>2</sup> cm. The pot which is used for removing paint from old dials prior to refinishing showed 18 mr per hr at the surface of the pot. The secretary's desk where the mail is opened showed 7500 cpm of alpha contamination as measured with the PAC 1SA. The results of this survey are shown on the attached sketch.

#### Waste Disposal

Mr. Bay stated that at intervals of approximately 6 months he removed the sludge from the stripping pot, took it to the sanitary landfill, dug a small hole and poured the sludge into the hole. The sanitary landfill operator then covered the material with refuse and dirt to a depth of from 20 to 50 feet. The vials which had contained radioactive material and been emptied were stored underneath the bench in the shop.

#### Records

None.

#### Remarks

At the time of the inspection, I made the following recommendations:

1. Dispose of glass bench tops.
2. Strip paint from bench tops and repaint with epoxy paint.
3. Since only a small amount of radium paint is kept on hand at any one time, put the paint in a small lead box for storage.
4. Install a hood for storage of dials awaiting processing and the paint which is on hand.
5. Ship empty bottles and sludge from the strip tank to a commercial disposal firm.
6. Get a film badge service.

Sooner Dial Company  
Clinton, Oklahoma

- 3 -

June 30, 1965

7. Post the entrance to the shop with "Caution-Radiation Area" and "Caution-Radioactive Materials."
8. Make a general cleanup and establish a routine cleanup procedure.
9. Obtain some sort of instrumentation which will detect the spills of radioactive material. This instrumentation should be capable of detecting alpha particles, however, it is possible that a black light would enable them to locate any spots of paint. Of course the black light would not enable them to distinguish between radioactive and non-radioactive paint.

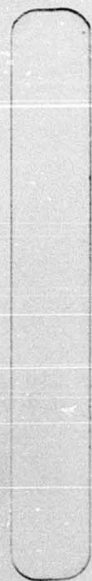
Date Inspected: June 23, 1965

Inspecting Officer

R. L. Craig  
Oklahoma State Department  
of Health



*Reference 7*



MEMORANDUM  
February 13, 1985

To: Sooner Dial Company File

From: Robert L. Craig, Director *RLC*  
Radiation Protection Division

Subject: Survey and Sampling

On February 11, 1985 I visited with Mr. Ron Grubbs, the present owner of the site. Mr. Terry Theisson, Custer County Sanitarian, accompanied me.

I told Mr. Grubbs of the results of Smith and Truby's visit to the site on January 24th and delivered Kellogg's letter.

Mr. Grubbs asked me what his legal position in this matter was. I told him that he should consult his attorney.

I told Mr. Grubbs that we needed a more detailed survey of both the vacant lot and the inside of the building. He gave his permission and assured me that he would cooperate in our investigation. He gave me the key to the building. After Mr. Theisson and I finished, I returned the key to Mr. Grubb's secretary and told her that I would write a report and send him a copy.

Theisson and I measured and recorded the gamma ray count rates at 45 locations. Two measurements were made at each location. The first was at about three feet above the ground surface. The second was at the surface of the ground. The measurements were made with the 1" x 1" NaI detector and the Ludlum Model 15 rate meter. The results of the measurements are shown on the attached sketch. The ground surface measurements are shown as the lower of the pair of numbers.

The general background count rate at locations off the site was 1,000 to 2,000 cpm.

Examination of the area near the water meter from which a sample was taken on January 24 (described then as a manhole) revealed a thin layer of hard, greenish-gray material which is very radioactive. The material had small spots or flecks of greenish-yellow material in it. It has the appearance of sludge with luminous paint in it.



In addition to the measurements, samples were taken at three locations on the site. The soil at each sampling location from the surface to 2 inches was marked as sample A, from 2 to 4 inches as sample B, and the soil from 4 inches to 6 inches as sample C. At point 2 the soil depth was only about 4 inches, so only 2 samples were taken there.

In general, the soil depth on the property was about 6 inches. Below this depth was sandstone which appeared to be undisturbed. Some places were very muddy and the soil may be deeper there.

On the concrete apron behind the building were found two localized hot spots, indicating the presence of radioactive material beneath the concrete.

There is a water line in the alley behind the site. At three locations where there are water meters, we found hot spots with count rates up to 250,000 counts per minute.

The inside of the building (which was being used as a warehouse for video games, pool tables, and other things) was surveyed for gamma and alpha radioactivity. Gamma ray levels were about 1,000 cpm. The rear portion of the warehouse had a bare concrete floor. Most of the floor had about 100 to 200 cpm of alpha radiation detectable. One swipe sample of a 100 sq cm area was taken.

The pattern of radioactivity found indicates wide spread contamination from the property across the alley to the street and extending down the alley to the south.

RLC/bh

cc: Bob Kellogg  
Dale McHard  
Wib Truby  
Coleman Smith

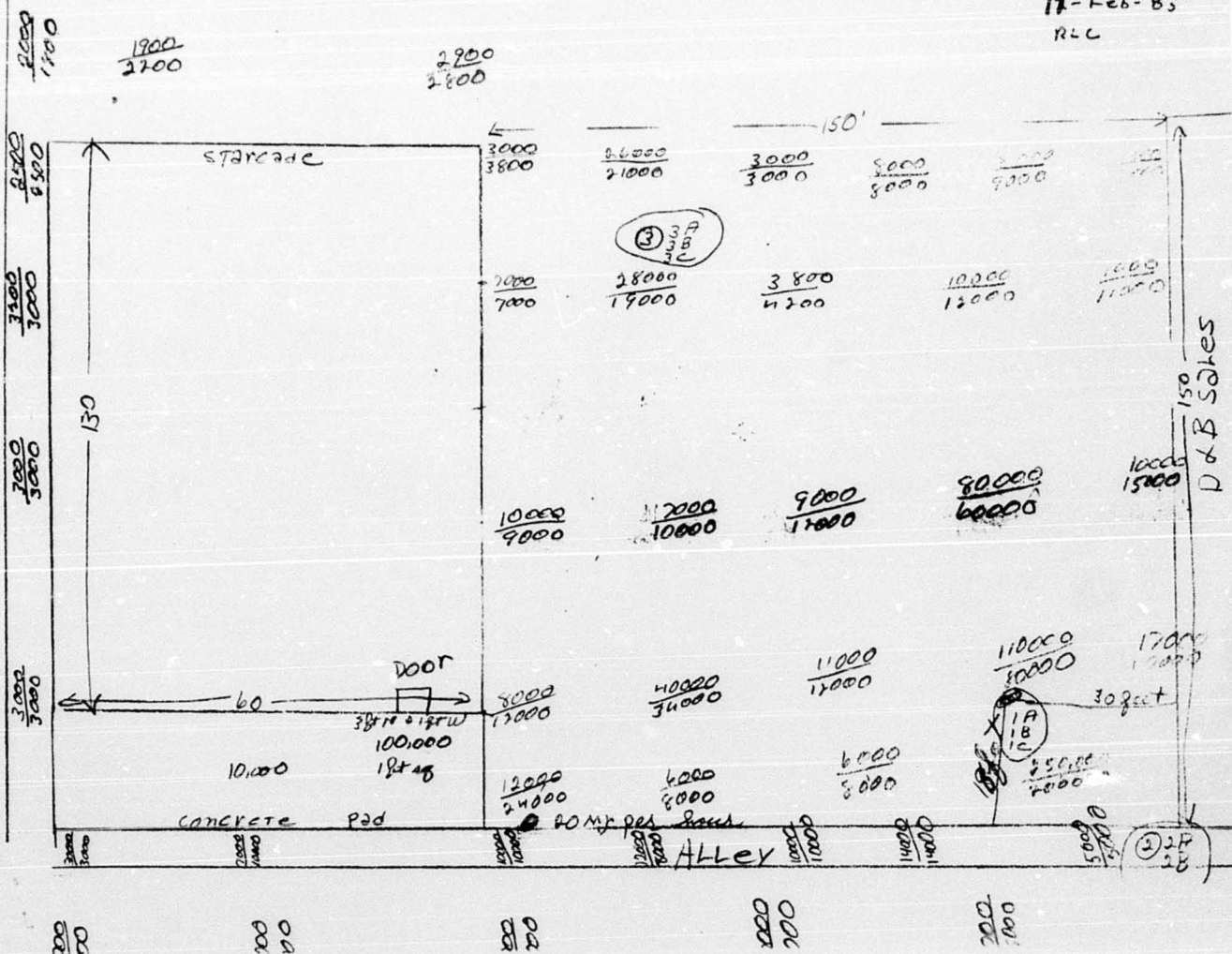
10th Street

Sooner Dial Co. 5/16

12-Feb-85

R.L.C.

Street



*Reference 8*





State Board of Health



Commissioner

A. B. COLYAR, M.D.

BERT T. BRUNDAGE, M.D., PRESIDENT  
OTHO R. WHITENECK, D.D.S., VICE PRESIDENT  
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EUGENE A. OWENS, M.D.  
CARL D. OSBORN, M.D.  
WILLIAM N. WEAVER, M.D.

State Department of Health  
State of Oklahoma

3400 NORTH EASTERN  
OKLAHOMA CITY, OKLAHOMA 73105

December 20, 1966

MEMORANDUM

To: Dale McHard *DMC*

From: J. M. Conlon

Subject: Sooner Dial Company, Clinton, Oklahoma

On December 12 and again on December 13, 1966, this writer contacted Mr. Charles E. Owens, General Manager of Sooner Dial Company, to inquire as to the status of the clean-up and initiation of protective measures as recommended by Robert Craig following his inspection of the user's dial refinishing operation on June 23, 1965, and to arrange for a follow-up visit on December 20<sup>th</sup>, 1966.

In the initial conversation, Mr. Owens indicated that the shop areas were being refinished with epoxy resin paints; the use of radium paints had been discontinued in this facility; monitoring of suspected areas in the plant had been performed with a Civil Defense CDV700, before it was "borrowed or stolen;" and that disposal of the radium wastes was being held pending receipt of some information from this office.

*RD is still  
being  
stuffed  
from old  
dials  
DMC*

When this writer's activities on December 13, 1966 prevented his visiting the Sooner Dial Company, Mr. Owens was contacted by local telephone, and the aforementioned subject discussed in somewhat greater detail. During this second conversation, Mr. Owens was informed that the department would forward a reiteration of the items discussed during Mr. Craig's inspection in June of 1965, and during his telephone conversation with this writer.

Specific recommendations and information are included in the correspondence attached for your review and signature.

It is suggested that Mr. Craig review the correspondence to assure that this writer has not confused the problem too much.

JMC:PL  
cc Mr. R. L. Craig

*Reference 9*



State Board of Health



Commissioner

KIRK T. MUSLEY, M. D.

BERT T. BRUNDAGE, M.D., PRESIDENT  
OTHO R. WHITENECK, D.D.S., VICE PRESIDENT  
MR. R. L. LOY, SECRETARY  
WAYNE J. BOYD, M.D.  
ROBERT L. LOFTIN, M.D.  
ROBERT D. McCULLOUGH, D.O.  
EUGENE A. OWENS, M.D.  
CARL D. OSBORN, M.D.  
WILLIAM N. WEAVER, M.D.

State Department of Health  
State of Oklahoma

3400 NORTH EASTERN  
OKLAHOMA CITY, OKLAHOMA 73105

August 31, 1965

MEMORANDUM

To: Dale McHard  
From: R. L. Craig  
Subject: Use of Radium by Aircraft Dial Refinishing Installations

A review of the information in our files concerning the use of luminous paints containing radium by shops engaged in the refinishing of aircraft instrument dials indicate that all of the installations engaged in similar work probably possess amounts of radium in excess of the exempt quantity. A search should be made to locate these installations and get them registered.

There will be many problems encountered in the inspection of these installations, most important of which are widespread alpha contamination and inadequate disposal practices.

It is common practice for an aircraft owner to send to these people by mail an instrument dial for refinishing which is painted with radium paint. The mail is usually opened by a secretary at her desk and then forwarded to the dial shop. (In at least one instance I have investigated, the secretary was employed by someone other than the dial painting company.) The dials are then transferred to the dial shop where they are stored awaiting processing. This storage is usually on a desk or table and no precautions are taken to prevent the spread of radium or radon. The processing consists of removing the old paint with solvent and repainting the dial either with a brush or by a silk screen process. The paint used is the dry powder type which is mixed with a binder prior to use. The paint removed from the dials settles to the bottom of the pot used for removal and is usually disposed of in a sanitary landfill. I have personally observed this procedure in one shop and, from the results of surveys made by Harry Brighton in Tulsa, assume that it is fairly standard throughout the industry.

Survey results have shown that high levels of widespread alpha contamination exist in these shops, up to 3,000,000 dpm per 100 sq.cm. The gamma exposure rates are not excessive for controlled areas.



Memorandum -  
Dale McHard

- 2 -

August 31, 1965

A copy of a survey I made at the Sooner Dial Company at Clinton is attached.

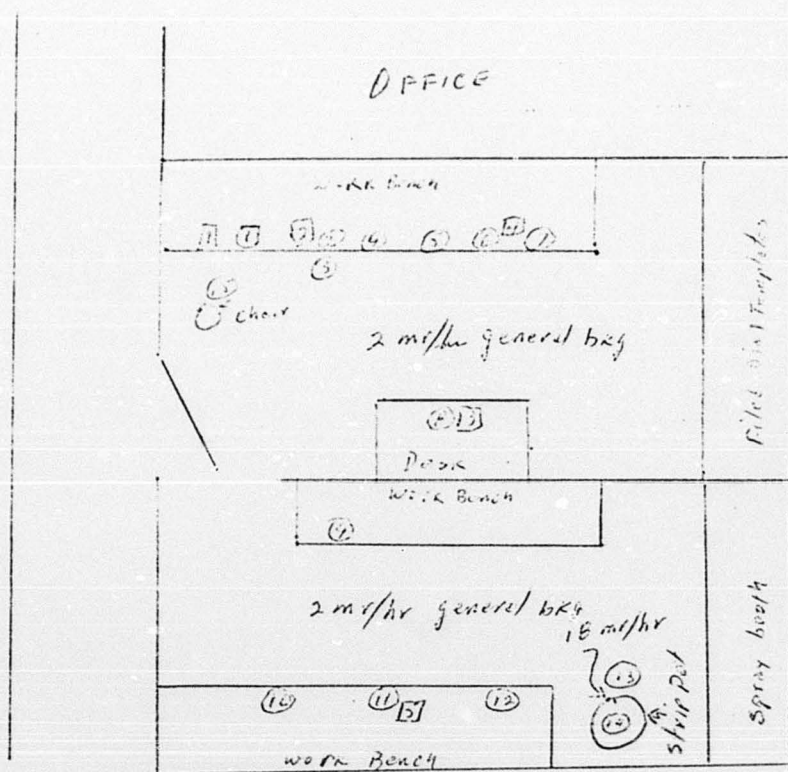
Recommendations for corrective actions to be taken by the facility owners are:

1. Clean up existing contamination.
2. Install hoods where dials containing radium may be stored prior to processing.
3. Conduct all processing of radioactive dials in a hood.
4. Cease any silk screening of radioactive paint. This recommendation needs further investigation since it may be the only method by which satisfactory work can be done.
5. Purchase monitoring equipment suitable for alpha detection.
6. Survey work areas routinely.
7. Dispose of radioactive waste through a commercial waste disposal firm.

In addition to the above recommendations, we should encourage the use of some other method of dial illumination, i.e., fluorescence under ultra-violet light, tritium activated paint, or promethium 147 activated paint.

RLC:PL  
Attachments

# Radiation Contamination Survey of Sooner Dial Co.



## SHOP

### Direct Survey

① 250K cpm	⑥ 10K	⑪ 115K
② 135K	⑦ 13.5K	⑫ 75K
③ 50K	⑧ 7.5K	⑬ 90K
④ 300K	⑨ 160K	⑭ 50K
⑤ 50K	⑩ 45K	⑮ 1.2K

### Wipes

①	42,778 dpm/cm <sup>2</sup>
②	544
③	1756
④	460
⑤	1071

6-2-67  
KLC

*Reference 10*





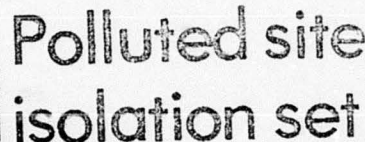


table levels of radiation on the property, making fencing and clean-up operations necessary to prevent "potential" public health problems. (Staff Photo)

## Five years of dialysis full of highs, lows

(See DIALYSIS Page 8)

Foley thanked CIS principal Ron Shimmel, Clinton Schools administrator Joe Bugenheuer and the Board of Education for their support.

How the radium entered in v  
"hot spots" has not been expl  
but it is known that the Soome  
Company and its predecessor  
a mixture of radium and a che  
agent called "phosphor" in the  
the - used to refinish aircraft  
struments to make them glow  
dark.

How the State Health Department officials became interested in the former Sooner Dam is interesting.

"That stuff must not be dangerous, or people like Bay wouldn't be so healthy," commented today.

## Trooper Nalley to be honored

The California State Highway



*Reference 11*

0

5

5

7

Memorandum  
January 23, 1985

To: File - January 21, 1985

From: Robert L. Craig, Director *RLC*  
Radiation Protection Division

Subject: Sooner Dial Co. - Clinton Oklahoma

Bob Gallegher, NSSI, called to report that he was working on a project in Texas which involves some silk screens purchased from Sooner Dial Co. in 1969. The screens are contaminated with radium.

RLC:dmm



*Reference 12*

0  
5  
5  
9

MEMORANDUM  
April 23, 1986

TO: Dale McHard, Chief *DMC*  
Radiation and Special Hazards Service

FROM: Robert L. Craig, Director *RLC*  
Radiation Protection Division

SUBJECT: Radium Contamination on Ray Wichert Property in Clinton, Oklahoma

On April 15, 1986 I took soil samples on the subject property for the purpose of evaluating the degree of radium contamination. I was accompanied by Terry Thiesson and Bob Giger, Custer County sanitarians. Mr. Wichert was not available to accompany us.

The property is on the south side of Clinton and lies just east of U.S. Highway 83 (map attached). On the west side of the property is a railroad track. On the east side is an intermittent water course which drains to the north. On the south side is a car wash. The level of the property is about six feet below the level of the adjoining property.

The property has been used in the past as a disposal site for concrete, asphalt, and dirt from construction sites in the City of Clinton. This debris is in piles up to three feet high which are fairly evenly distributed over the property. The large pieces of concrete and other construction debris prevented easy access to parts of the site. The drainage of surface water is to the north toward the intermittent water course. The soil is thin, estimated to one or two inches above the underlying sandstone.

The property was surveyed with the 1 X 1 inch NaI detector and the background radiation was found to be about 10 microroentgen per hour (micro R/hr) which is normal for that area in Oklahoma. There were spots in the area where the radiation levels were found to be in excess of 100 micro R/hr. These levels were found in the vicinity of some piles of debris and in the area over which drainage from the piles would have passed.

A rough sketch of the area is attached. The piles of debris near which elevated external gamma radiation levels were found are identified as A, B, C, D, F, and G. The drainage area which was sampled is identified as E.

Samples were taken with a 3/4 inch diameter core sampler which was 8 inches long. At the location where it was possible to obtain an 8 inch core, the samples were divided into two portions, surface to four inches depth and four to eight inches depth, which were analyzed separately. For purposes of comparison a similar sample was collected from the lawn of the State Health Department.

The results of the analyses were:

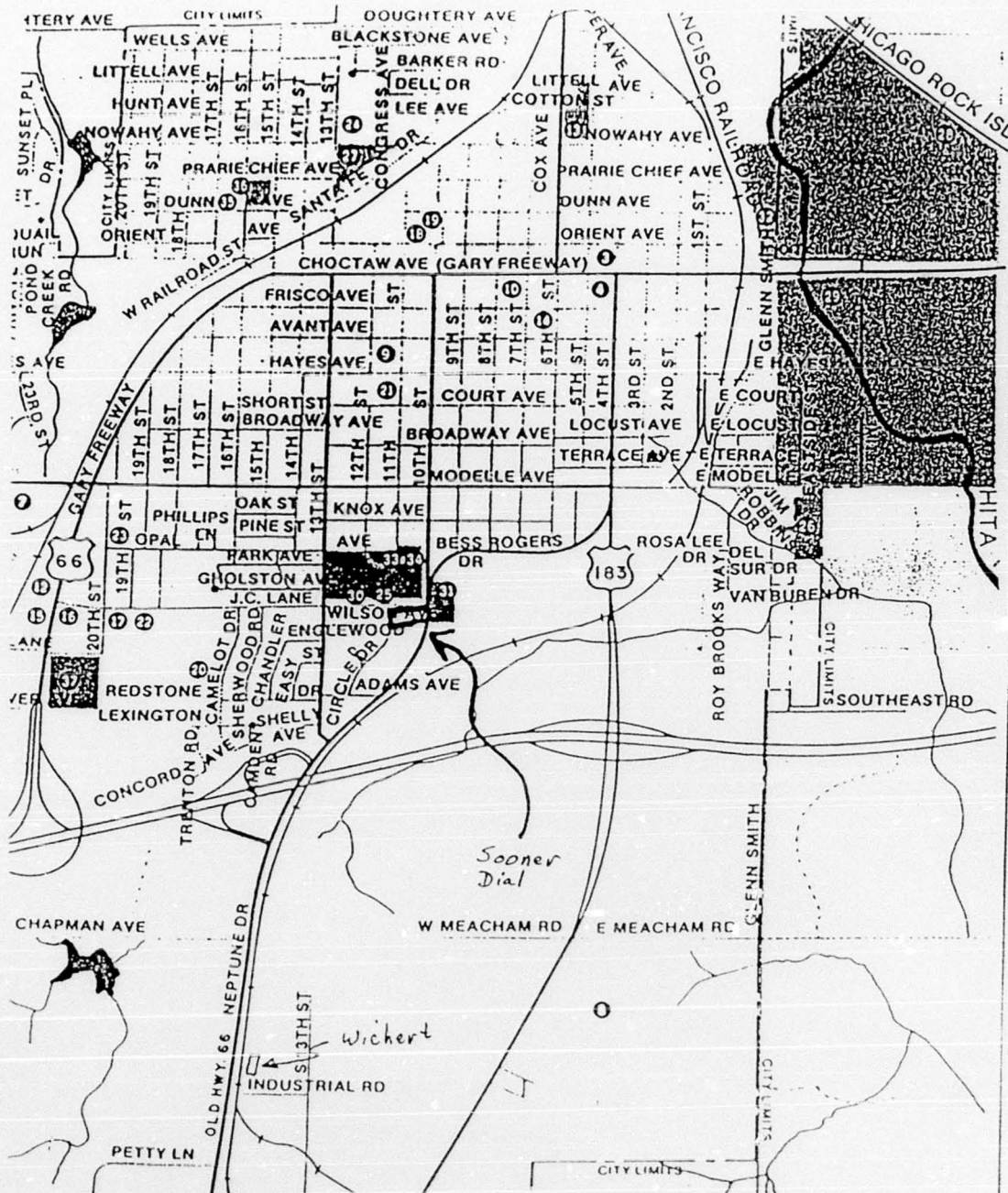
<u>Sample Point</u>	<u>Depth (inches)</u>	<u>Radium (p Ci/gm)</u>
A	0-4	23
A	4-8	33
B	0-4	49
B	4-8	163
C	0-4	27
D	0-4	149
E	0-1	113
F	0-4	37
F	4-8	67
G	0-4	63
OSDH	0-4	< 4
Shield Background	--	< 4

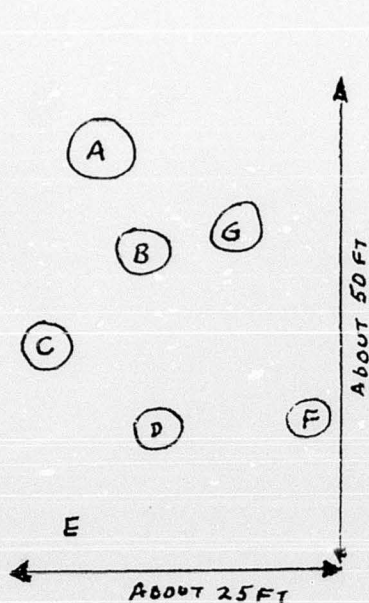
Minimum Detectable Concentrations - 4 pCi/gm

Attachments

cc: Terry Thiesson







Wichert Property  
Clinton, OK

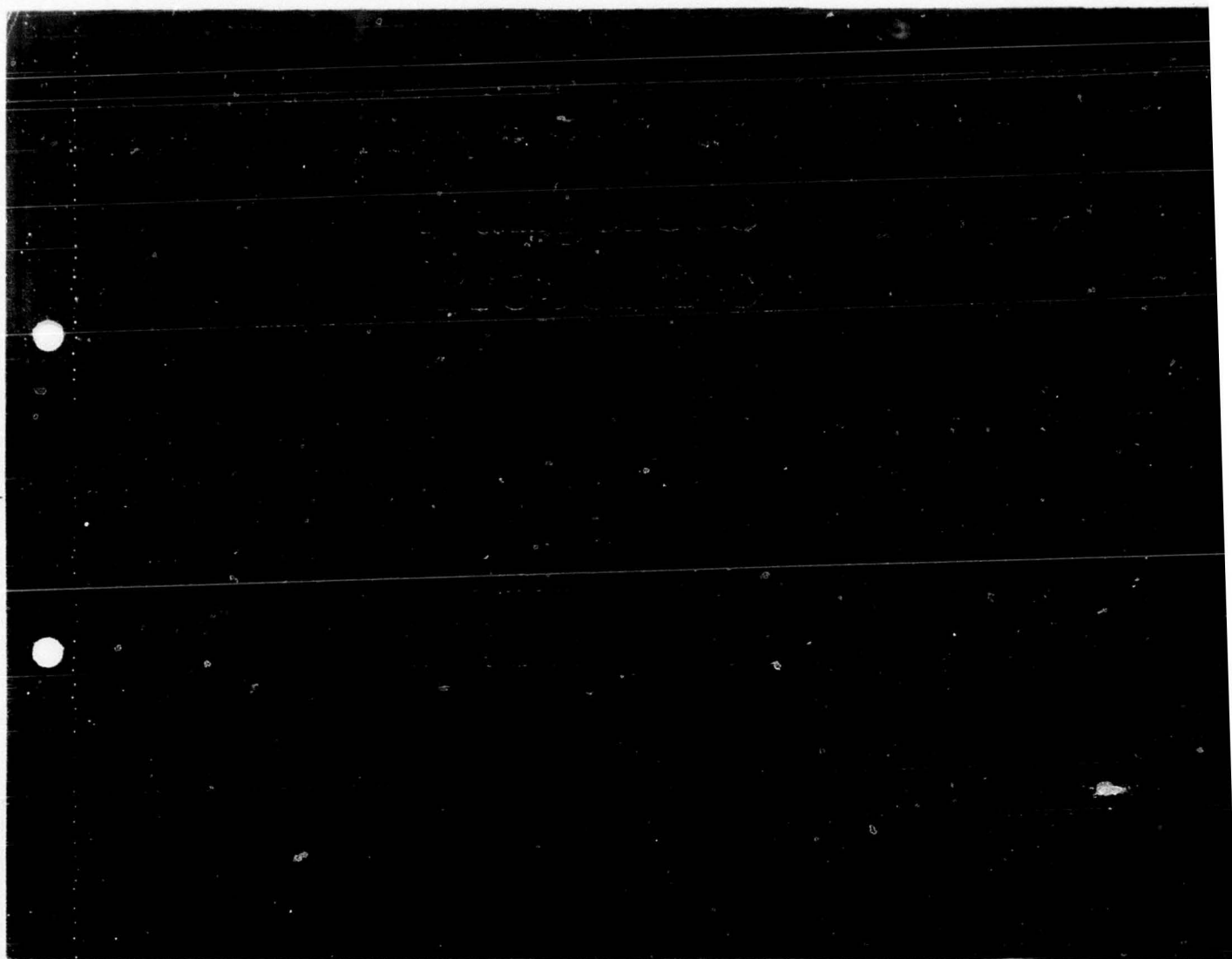
Sample Collection Points

15-APR-86  
RCC

*Reference 13*







mass and may or may not be electrically charged, i.e., alpha (positive) and beta (negative); also neutrons. Beams of such particles may be considered as "rays." The charged particles may all be accelerated and high energy imparted to "beams" in particle accelerators such as cyclotrons, betatrons, synchrotrons and linear accelerators.

Type of radiation	Wavelength Å
cosmic	0.0005-0.005
gamma	0.005 -1.4
X	0.1 -100
UV	100 -4000
visible	4000 -7000
infrared	7000 -2,000,000

**Radiation, ionizing:** Extremely short-wavelength, highly energetic penetrating rays of the following types: (a) gamma rays emitted by radioactive elements and radioisotopes (decay of atomic nucleus); (b) x-rays, generated by sudden stoppage of fast-moving electrons; (c) subatomic charged particles (electrons, protons, deuterons) when accelerated in a cyclotron or betatron. The term is restricted to electromagnetic radiation at least as energetic as x-rays, and to charged particles of similar energies. Neutrons also may induce ionization.

Such radiation is strong enough to remove electrons from any atoms in its path, leading to the formation of free radicals. These short-lived but highly reactive particles initiate decomposition of many organic compounds. Thus ionizing radiation can cause mutations in DNA and in cell nuclei; adversely affect protein and amino acid mechanisms; impair or destroy body tissue; and attack bone marrow, the source of red blood cells. Exposure to ionizing radiation for even a short period is highly dangerous, and for an extended period may be lethal. The study of the chemical effects of such radiation is called radiation chemistry or (in the case of body reactions) radiation biochemistry.

## RADIUM

af: Ra; aw: 226

A radioactive earth metal. Brilliant white, tarnishes in air. Decomps in water; mp: 700°; bp: 1737°; d: 5.5.

**THR:** Common air contaminant. A highly radiotoxic element.  $1\text{ g} = 3.7 \times 10^{10}$  dps. Inhal, ingestion or bodily exposure to Ra can lead to lung cancer, bone cancer, osteitis, skin damage and blood dyscrasias.

Ra replaces calcium in the bone structure and is a source of irradiation to the blood forming organs. The ingestion of luminous dial paint prepared from radium was the cause of death of many of the early dial painters before the hazard was fully understood. The data on these workers has been the source of many of the radiation precautions and the maximum permissible levels for internal emitters which are now accepted.  $^{226}\text{Ra}$

is the parent of radon and the precautions described under  $^{222}\text{Rn}$  should be followed.

$^{226}\text{Ra}$  is a member of the thorium series. It was a common constituent of luminous paints, and while its low beta energy was not a hazard, its daughters in the series may have been a causative agent in the deaths of the radium dial painters following World War I. Its metabolism is the same as any other radium isotope and it is a source of thoron. The precautions recommended under  $^{220}\text{Rn}$  should be followed.

**Disaster Hazard:** Highly dangerous; must be kept heavily shielded and stored away from possible dissemination by explosion, flood, etc.

**Radiation Hazard:** Natural isotope  $^{223}\text{Ra}$  (Actinium-X, Actinium Series),  $T_{1/2} = 11.4\text{D}$ , decays to radioactive  $^{219}\text{Rn}$  via alphas of 5.5-5.7 MeV. Natural isotope  $^{224}\text{Ra}$  (Thorium-X, Thorium Series),  $T_{1/2} = 3.6\text{D}$ , decays to radioactive  $^{220}\text{Rn}$  via alphas of 5.7 MeV. Natural isotope  $^{226}\text{Ra}$  (Uranium Series),  $T_{1/2} = 1600\text{y}$ , decays to radioactive  $^{222}\text{Rn}$  via alphas of 4.8 MeV. Natural isotope  $^{228}\text{Ra}$  (Mesothorium = 1, Thorium Series),  $T_{1/2} = 6.7\text{y}$ , decays to radioactive  $^{228}\text{Ac}$  via betas of 0.05 MeV.

## RADON

mf: Rn; mw: 86

Colorless, odorless, inert gas, very dense. bp:  $-62^\circ$ ; d (gas @ 1 atm and  $0^\circ$ ): 9.73 g/L, (liq @ bp): 4.4.

**THR:** A common air contaminant.

**Radiation Hazard:** Natural isotope  $^{220}\text{Rn}$  (Thoron, Thorium Series),  $T_{1/2} = 55\text{s}$ , decays to radioactive  $^{216}\text{Po}$  via alphas of 6.3 MeV. Natural isotope  $^{222}\text{Rn}$  (Uranium Series),  $T_{1/2} = 3.8\text{d}$ , decays to radioactive  $^{218}\text{Po}$  via alphas of 5.5 MeV. The permissible levels are given for  $^{222}\text{Rn}$  in equilibrium with its daughters. The chief hazard from this isotope is inhal of the gaseous element and its solid daughters, which are collected on the normal dust of the air. This material is deposited in the lungs and has been considered to be a major causative agent in the high incidence of lung cancer found in uranium miners. Radon and its daughters build up to an equilibrium value in about a month from radium compounds, while the build-up from uranium compounds is negligible. Good ventilation of areas where radium is handled or stored is recommended to prevent accumulation of hazardous conc of Rn and its daughters.

## RAISNOMYCIN

CAS RN: 1393040

NIOSH #: VE 4725000

Produced by Streptomyces Kentuckensis (ANTCAO 6,286,56)

### TOXICITY DATA:

3

### CODEN:

unk-rat LDLo: 28 mg/kg  
unk-mus LD50: 28 mg/kg

ANTCAO 6,286,56  
85ERAY 1,267,78

**THR:** HIGH unk.

**Disaster Hazard:** When heated to decomp it emits acrid smoke and fumes.

*Reference 14*

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2

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1



LAW OFFICE

MARK S. SCHWARTZ

SUITE 1850, CITY PLACE

204 NORTH ROBINSON

OKLAHOMA CITY, OKLAHOMA 73102

ADMITTED TO PRACTICE:  
STATE OF OKLAHOMA  
STATE OF NEW YORK

April 19, 1991

RECEIVED

APR 22 1991

ENV. HEALTH  
ADMINISTRATION

TEL. (405) 232-3407  
FAX. (405) 232-3461

Mr. Jimmy D. Givens  
Enforcement Attorney  
Oklahoma State Department of Health  
P.O. Box 53551  
1000 N.E. 10th Street  
Oklahoma City, OK 73152

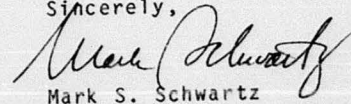
Re: Ron Grubb;  
Sooner Dial Site

Dear Mr. Givens:

Enclosed herewith please find a report dated March 27, 1991, as prepared by Techrad Environmental Services, Inc. As the report states, they have performed an initial site assessment of the subject property. Based upon the findings by Techrad, it would appear that the proposed work plan as prepared by OSDH is more than needed for remediation at the site. I would appreciate it if you would have your staff review the enclosed report and advise my office if OSDH is agreeable to a remediation plan based on the Techrad report.

I look forward to hearing from your office regarding this matter.

Sincerely,

  
Mark S. Schwartz

MSS:cmc

Encl.

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# TECHRAD

ENVIRONMENTAL SERVICES, INC.

4619 N. Santa Fe  
6946 E. 13th St.

Oklahoma City, OK 73118-7995  
Tulsa, OK 74112  
FAX 405/528-3346

405/528-7016  
9:8/838-3590

March 27, 1991

Mr. Mark Schwartz  
Suite 1850, City Place  
204 North Robinson  
Oklahoma City, OK 73102

RE: Sooner Dial Site  
1002 S. 10th Street  
Clinton, OK

Dear Mr. Schwartz:

On February 28, 1991, Mr. R.L. Naylor and Mr. Michael Key of TECHRAD Environmental Services, Inc. performed an initial site assessment of the Sooner Dial Site, 1002 South 10th Street, Clinton, Oklahoma. The purpose of the assessment was to determine the extent of radiation on the site.

The site was surveyed using a Ludlum Model 19, Micro R Meter, Ludlum Instruments, Inc. Sweetwater, Texas. The survey was conducted by walking the site, both the building and the vacant lot to the south, with the meter approximately one meter above the ground. Background radiation was found to be 6 to 8 micro Roentgens per hour ( $\mu\text{R/hr}$ ). One "hot" spot was found within the building; approximately 40' west and 10' south of the N.E. corner of the building a reading of 80  $\mu\text{R/hr}$  was observed. Radiation levels of 50  $\mu\text{R/hr}$  or less are considered safe. The elevated level was observed in only a very small area, approximately 3' x 4'.

Outside the building, on the west end, is a concrete slab. Near the southwest corner of the slab readings of 600-1200  $\mu\text{R/hr}$  were obtained. These elevated readings were over an area of approximately 400 square feet. The remainder of the vacant lot yielded readings of 25-150  $\mu\text{R/hr}$ . Elevated readings, 60-100  $\mu\text{R/hr}$  were also observed in the yard west of the site.

The Proposed Work Plan prepared by the Oklahoma State Department of Health (OSDH) appears to be overkill. The cost of the sampling plan alone could be as much as \$45,000. Analyses for radium, gross alpha and gross beta are quite expensive and are redundant to what can be obtained on-site with a Micro R Meter.

CONSULTANTS    HAZARDOUS WASTE MANAGEMENT    ASBESTOS MANAGEMENT    ANALYTICAL LABORATORY



Mr. Mark Schwartz  
March 27, 1991  
Page Two

We believe that the entire clean up can be accomplished for about the cost of the sampling plan proposed by OSDH.

TECHRAD has on staff a Certified Industrial Hygienist who was a Radiation Safety Officer in the Air Force and many other professionals experienced in site remediation and disposal of hazardous materials. We would be pleased to offer a formal proposal if your client is interested.

Thank you for the opportunity to be of service. Please call if you have questions or if we may be of further assistance.

Sincerely,

TECHRAD Environmental Services, Inc.

Robert L. Naylor  
Manager of Engineering Services

RLN:tgg

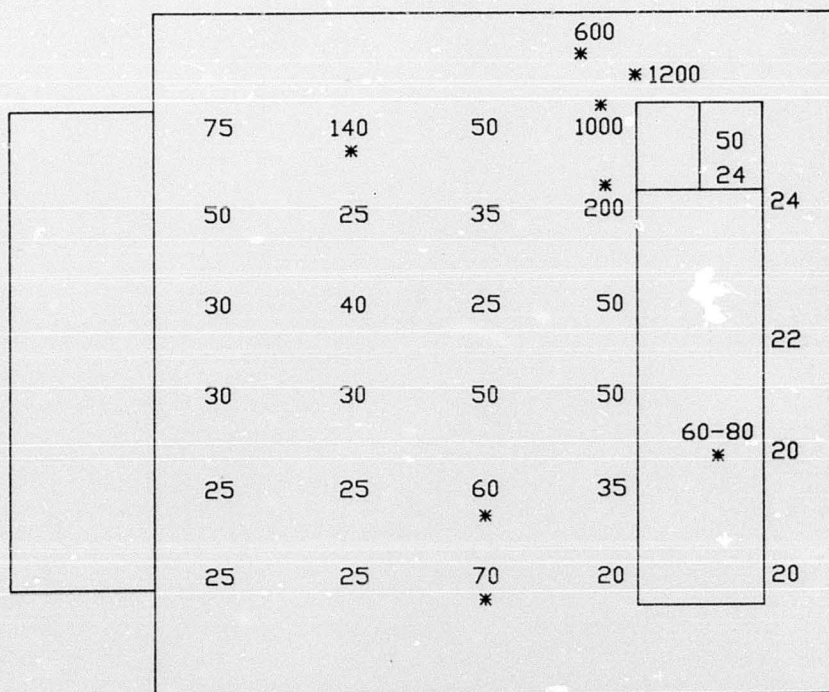


SOONER DIAL SITE  
1002 S. 10th STREET  
CLINTON, OK.

\* 60

\* 100

ALLEY



Radiation Levels in uR/hr

TECHRAD ENVIRONMENTAL SERVICES, INC.	
4619 N. SANTA FE	
OKLAHOMA CITY, OK. 73118	
SCALE: NTS	DATE SURVEYED: 2-28-91

*Reference 15*

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MEMORANDUM  
March 21, 1985

To: Mark S. Coleman, Deputy Commissioner  
for Environmental Health Services

From: Dale McHard, Chief *DM*  
Radiation and Special Hazards Service

Subject: Sooner Dial Company site, Clinton--Additional  
Investigative Issues

This memo is to present additional issues which should be investigated to the extent necessary to determine any information pertinent to overall program effort in regard to the radium contamination existing at the Sooner Dial Company site. Reference should be made to the memoranda and letters written in connection with this case since February 5, 1985.

1. Sewer/septic tank system--Mr. Thiesson, Custer County Health Department, has been asked to make a preliminary determination whether this site has been served by sewers or septic tank systems since at least 1965. If it is determined that a septic tank system was utilized (particularly during the time radium dial stripping was conducted), additional investigation in this regard will be required.
2. Ownership of the property--A record search of Custer County records should be conducted to determine each and every owner of this property since at least 1965. Written or personal contact with each of the owners so identified may be necessary.
3. Description of property--A legal description of the property, particularly in regard to defining easements and setting forth boundaries, should be obtained.
4. Scale or plat map--If a scale or plat map is readily available in the county records, a copy of such map should be obtained for our use.
5. Water/sewer line--We suspect that a water or sewer line at the back of the property has been constructed or has had repairs recently. The City of Clinton should be requested to give us information in this regard; if it is determined that a crew has been working in this area, it probably will be necessary to interview the contractor or foreman of the crew.



6. Legal opinion--It would be helpful if we could obtain a copy of the court's opinion and the case summary of Johnston vs USA which involved a radium paint stripping operation in Wichita, Kansas.

7. Possible sources to defray clean-up costs--An investigation should be made to determine any connection between Sooner Dial and its owners and Luminous Products, a now-defunct corporation. Safety Light Corporation, Bloomsburg, Pennsylvania is an apparent successor company to Luminous. If investigation reveals a connection between Sooner Dial and Luminous, then there may exist potential liability in regard to clean-up of the site.

DMC/bh

cc: Bob Kellogg  
Wib Truby

*Reference 16*



SOIL SURVEY OF

# Custer County, Oklahoma

---



United States Department of Agriculture  
Soil Conservation Service

In cooperation with  
Oklahoma Agricultural Experiment Station



Representative profile of Tivoli loamy fine sand in an area of Pratt and Tivoli soils, 8 to 12 percent slopes (W), 1,575 feet south and 75 feet west of the northeast corner of sec. 10, T. 15 N., R. 14 W.:

- A1—0 to 6 inches, brown (10YR 5/3) loamy fine sand, brown (10YR 4/3) when moist; single grained; very friable; neutral; gradual, wavy boundary.  
C—6 to 72 inches, light-brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) when moist; single grained; loose; neutral.

The A1 horizon is brown, grayish-brown, light brownish-gray, or pale-brown loamy fine sand or fine sand. It is neutral to mildly alkaline. The C horizon is light brown, brown, strong brown, reddish yellow, reddish brown, or light reddish brown. It is neutral to mildly alkaline.

Tivoli soils in this survey area are mapped only in an undifferentiated group with Pratt soils.

### Woodward Series

The Woodward series consists of moderately deep, well-drained, very gently sloping to strongly sloping soils on uplands. These soils formed in material weathered from sandstone under a cover of native grasses.

In a representative profile the surface layer is 10 inches of reddish-brown silt loam. The subsoil, to a depth of 30 inches, is red silt loam. The underlying material is red partly weathered sandstone.

Permeability is moderate. Available water capacity is high.

Representative profile of Woodward silt loam in an area of Woodward-Quinlan complex, 5 to 12 percent slopes, 1,080 feet south and 30 feet east of the northwest corner of sec. 4, T. 14 N., R. 20 W.:

- A1—0 to 10 inches, reddish-brown (5YR 4/4) silt loam, dark reddish brown (5YR 3/4) when moist; moderate, medium, granular structure; friable; calcareous; moderately alkaline; gradual, smooth boundary.  
B2—10 to 30 inches, red (2.5YR 4/6) silt loam, dark red (2.5YR 3/6) when moist; weak, medium, granular structure; friable; calcareous; moderately alkaline; gradual, wavy boundary.  
C—30 to 40 inches, red (2.5YR 4/6) partly weathered sandstone, dark red (2.5YR 3/6) when moist; calcareous; moderately alkaline.

The A1 or Ap horizon is reddish-brown, brown, or red silt loam or loam. It is moderately alkaline to neutral. The B2 horizon is reddish-brown or red silt loam or loam. It is mildly alkaline or moderately alkaline. Depth to sandstone is 20 to 40 inches.

### WoB—Woodward silt loam, 1 to 3 percent slopes.

This soil is very gently sloping.

Included with this soil in mapping are areas of a soil that is similar to this Woodward soil, but it is 40 to 60 inches deep over sandstone. This soil makes up about 40 percent of the mapped areas. Also included are areas of Carey and Quinlan soils. Carey soils make up about 5 percent of the unit, and Quinlan soils 3 percent.

Most of this soil is used for wheat. Some areas are in other small grain, grain sorghum, cotton, tame pasture grasses, and native grasses.

The main concerns of management are controlling erosion and maintaining soil structure and fertility. If this soil is well managed, most of the suited crops

can be grown. Returning crop residue to the soil and supplying plant nutrients are good management practices. Terraces with protected outlets, contour farming, and minimum tillage are needed if row crops are grown. Capability unit IIf-1; Loamy Prairie range site; pasture and hayland suitability group 8A; tree suitability group 6.

### WoC—Woodward silt loam, 3 to 5 percent slopes.

This soil is gently sloping.

Included with this soil in mapping are areas of Quinlan, Minco, and Carey soils. Quinlan soils make up about 8 percent of the mapped areas, Minco soils 5 percent, and Carey soils 2 percent.

Most of this soil is used for wheat. Some areas are in other small grain, grain sorghum, cotton, tame pasture grasses, and native grasses.

The main concerns of management are controlling erosion and maintaining soil fertility and structure. If row crops are grown, terraces with protected outlets (fig. 7) and contour farming are needed. Where terraces are not used, a cropping system is needed that includes only soil-maintaining crops. Returning large amounts of crop residue to the soil and supplying plant nutrients help to maintain content of organic matter and fertility, to retain structure, and to increase the intake rate of water. Capability unit IIIf-1; Loamy Prairie range site; pasture and hayland suitability group 8A; tree suitability group 6.

### WoD—Woodward silt loam, 5 to 8 percent slopes.

This soil is sloping.

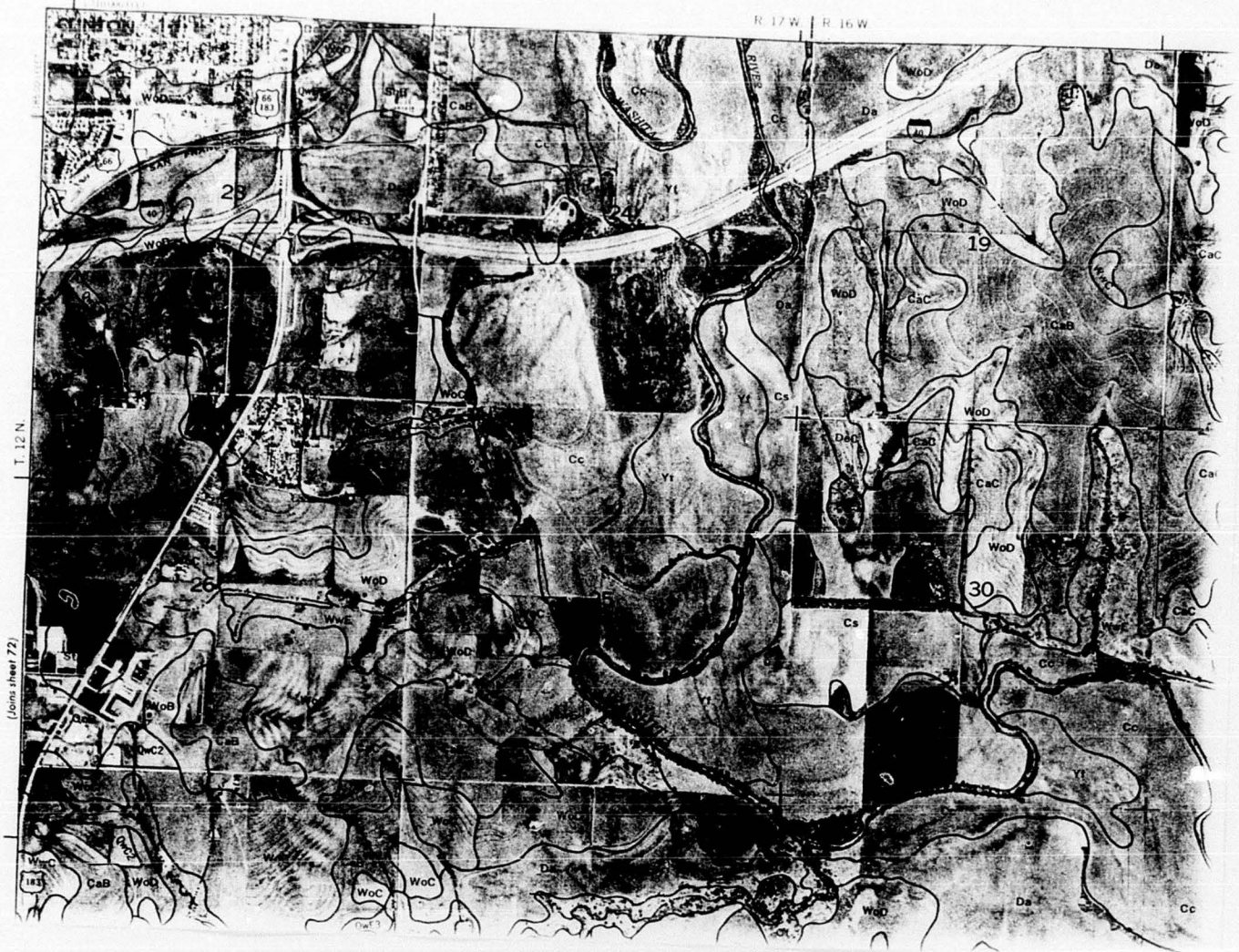
Included with this soil in mapping are areas of Quinlan and Minco soils. Quinlan soils make up about 10 percent of the mapped areas, and Minco soils 8 percent.

Most of this soil is used for wheat. Some areas are in other small grain, grain sorghum, tame pasture grasses, and native grasses.

The main concerns of management are controlling erosion and maintaining soil structure and fertility. Returning crop residue to the soil and supplying plant nutrients are good management practices. Terraces with protected outlets, contour farming, and minimum tillage are needed. Capability unit IVIf-1; Loamy Prairie range site; pasture and hayland suitability group 8A; tree suitability group 6.

**Wt—Woodward-Clairemont complex.** These soils are nearly level to strongly sloping. About 45 percent of the complex is Woodward soils that have slopes of 1 to 12 percent, and 25 percent is Clairemont soils that have slopes of 0 to 1 percent. The Woodward soils have a profile similar to the one described as representative for the Woodward series, but the surface layer is silt loam or loam. The Clairemont soils have a profile similar to the one described as representative for the Clairemont series. Woodward and Clairemont soils are in such an intricate pattern that it is impractical to map them separately. Clairemont soils are frequently flooded.

Included with these soils in mapping are areas of Quinlan, Carey, St. Paul, and Yahola soils. Quinlan soils make up about 10 percent of the mapped areas, and Carey, St. Paul, and Yahola soils each about 5 percent. Also included are areas of a soil that is similar



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*Reference 17*





# OKLAHOMA GEOLOGICAL SURVEY

BULLETIN 114

PLATE 1. GEOLOGIC MAP OF CUSTER COUNTY

PLATE 2. ISOPACH AND STRUCTURE CONTOUR MAPS

PLATE 3. CORRELATION DIAGRAMS

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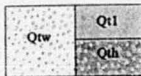
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## EXPLANATION

Qal

## ALLUVIUM

(Sand, silt, and clay, up to 132 feet thick, with gravel at the base, along major rivers and in stream valleys.)



## TERRACE DEPOSITS

(Scattered gravels and finer sediments, up to 100 feet thick, in several terrace levels along former courses of present-day streams, with Pearlette volcanic ash in T. 14 N., R. 16 W., in high terrace levels of late Kansan age. Qtw: Washita River deposits; Qth: Deer Creek deposits and Canadian River high-level terrace deposits; Qtl: Canadian River low-level deposits.)

## unconformity

Kd

## DAKOTA GROUP

(unnamed lower sandstone)

(Brown to gray sandstone and quartzite blocks (Kd) up to 8 feet thick, in isolated collapsed structures in southwestern part of the county.)

## unconformity

Kk

## KIOWA FORMATION

(Dark-gray to brown fossiliferous shale and *Texigryphaea* limestone blocks (Kk), in isolated collapsed structures.)

## unconformity

Pec

## ELK CITY SANDSTONE

(Orange-brown sandstone as much as 50 feet thick, with top eroded, with prominent thin maroon shale about 14 feet above the base, and greenish-gray siltstone and shale at base.)

Pdy

## DOXEY SHALE

(Red-brown shale and well-indurated siltstones, approximately 195 feet thick, with a 0.4-foot tan dolomite about 72 feet above the base, and a greenish-gray calcitic siltstone at the base.)



QUATERNARY

HOLOCENE

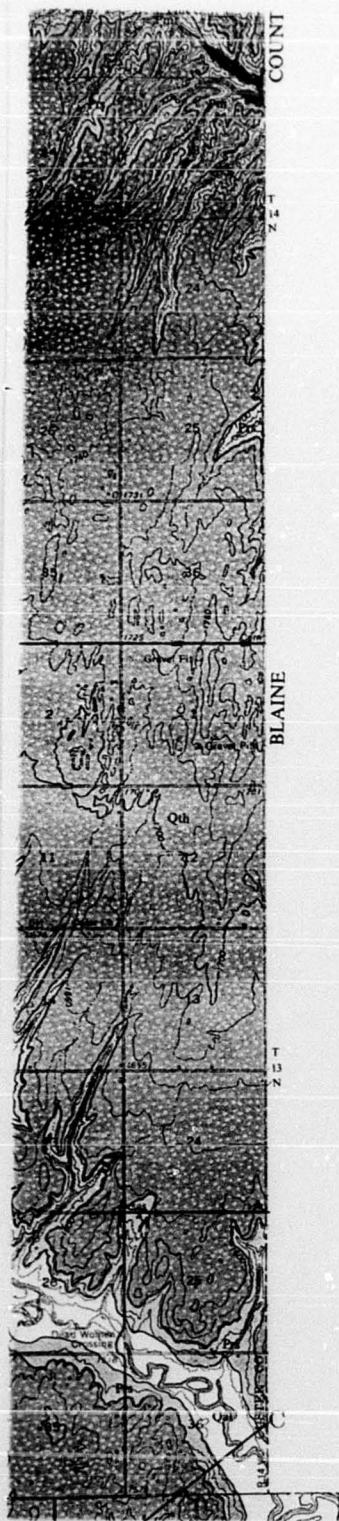
PLEISTOCENE

CRETACEOUS

COMANCHEAN

GROUP





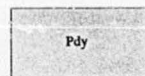
PERMIAN

CUSTERIAN

FOSS GROUP

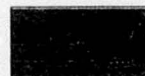
WHITE HORSE GROUP

prominent thin maroon shale about 14 feet above the base, and a greenish-gray siltstone and shale at base.



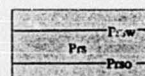
#### DOXEY SHALE

(Red-brown shale and well-indurated siltstones, approximately 195 feet thick, with a 0.4-foot tan dolomite about 72 feet above the base, and a greenish-gray calcitic siltstone at the base.)



#### CLOUD CHIEF FORMATION

(Orange-brown to red-brown shale, siltstone, and sandstone, 171 to 177 feet thick, with the 0.1- to 10-foot Day Creek Bed (Pccd) 28 to 52 feet above the base, and a 1- to 9-foot gypsum, dolomite, greenish gray zone or multiple zones (Moccasin Creek Bed) at base, gradational into as much as 118 feet of gypsum at the base in the Clinton-Weatherford area.)



#### RUSH SPRINGS FORMATION

(Primarily orange-brown quartzose sandstone, 300 to 430 feet thick, with the 1- to 8-foot Weatherford Bed (Prsw) of gypsum and dolomite 24 to 52 feet below top, and the 0.5- to 2-foot Old Crow Bed (Prso) of gypsum and dolomite 120 to 175 feet below top. The section is thicker southward, and the Weatherford Bed is primarily a dolomite eastward in the buttes along section E-E', gradational westward into gypsum. In the southwestern part of the county (section A-A') the Weatherford Bed is apparently absent. The Old Crow Bed is absent in the southeastern part of the county.)



#### MARLOW FORMATION

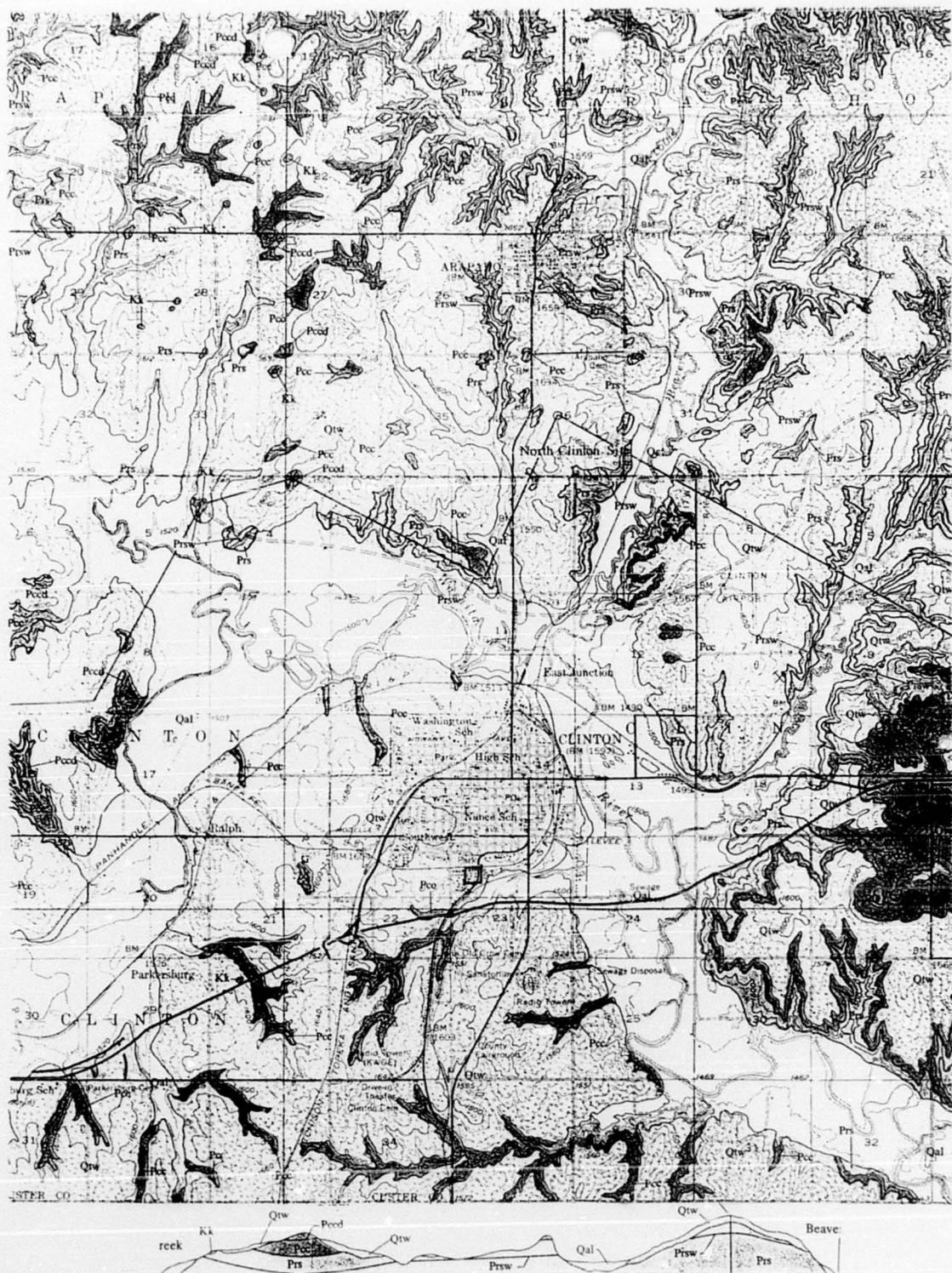
(Orange-brown sandstone, with the 0.1-foot maroon to pink Emanuel Bed (Pme) of dolomite at top, and the 0.1-foot dark-gray to maroon Relay Creek Bed (Pmr) 17 to 25 feet below top. Only upper 50 feet exposed. On south side of Canadian River in steep cliff faces, Emanuel and Relay Creek Beds are mapped together.)

Formational contact;  
dashed where inferred

A ————— B  
Line of cross section

Contour interval 20 feet





Reference 18





Multi-Site

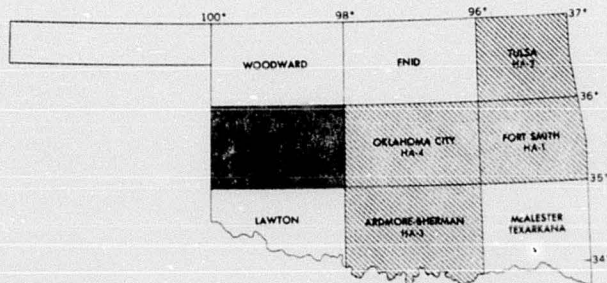
OKLAHOMA GEOLOGICAL SURVEY  
Charles J. Mankin, *Director*

HYDROLOGIC ATLAS 5

RECONNAISSANCE OF THE WATER RESOURCES OF THE CLINTON QUADRANGLE  
WEST-CENTRAL OKLAHOMA

By  
JERRY E. CARR and DE ROY L. BERGMAN  
U.S. Geological Survey

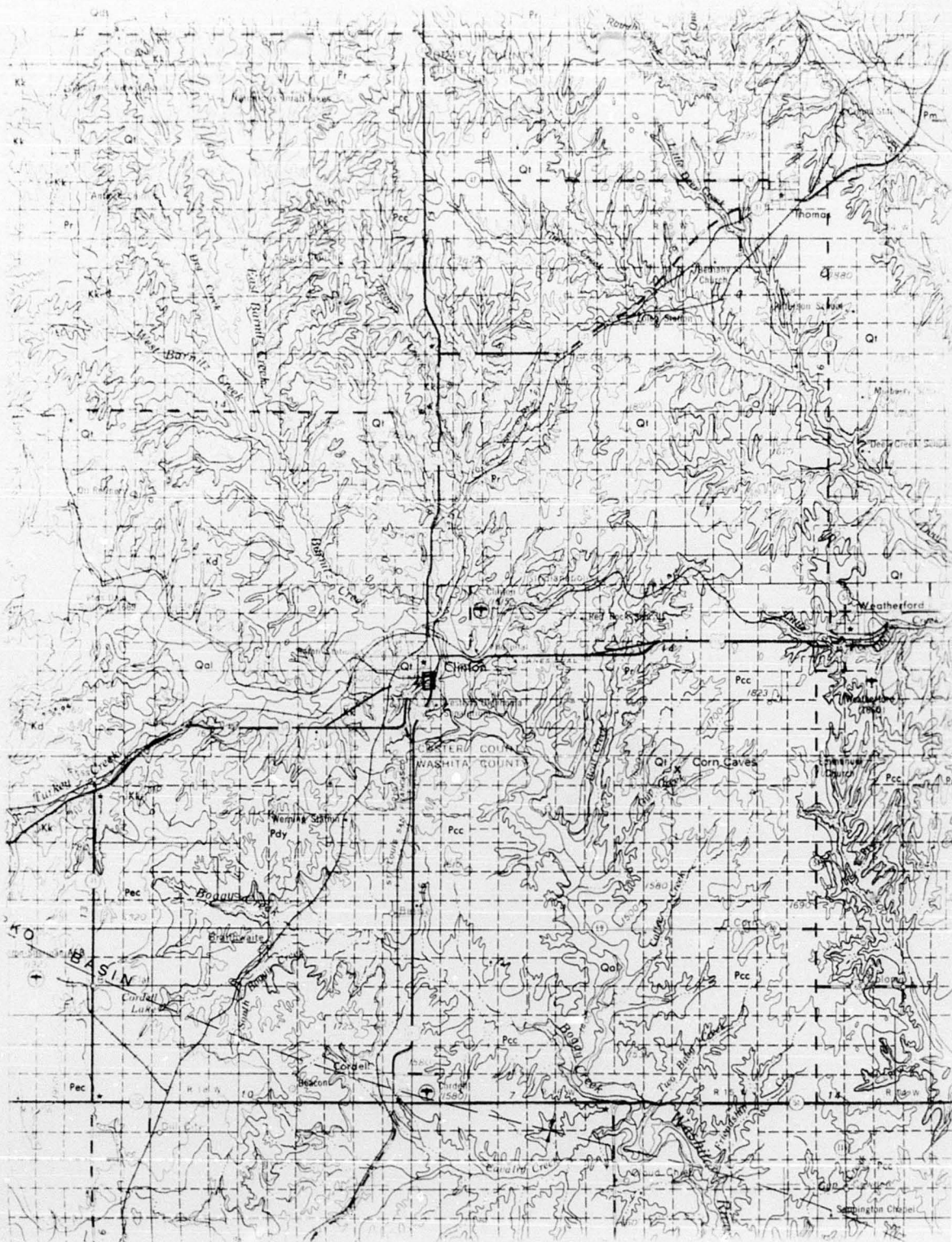
Prepared in cooperation with  
UNITED STATES GEOLOGICAL SURVEY



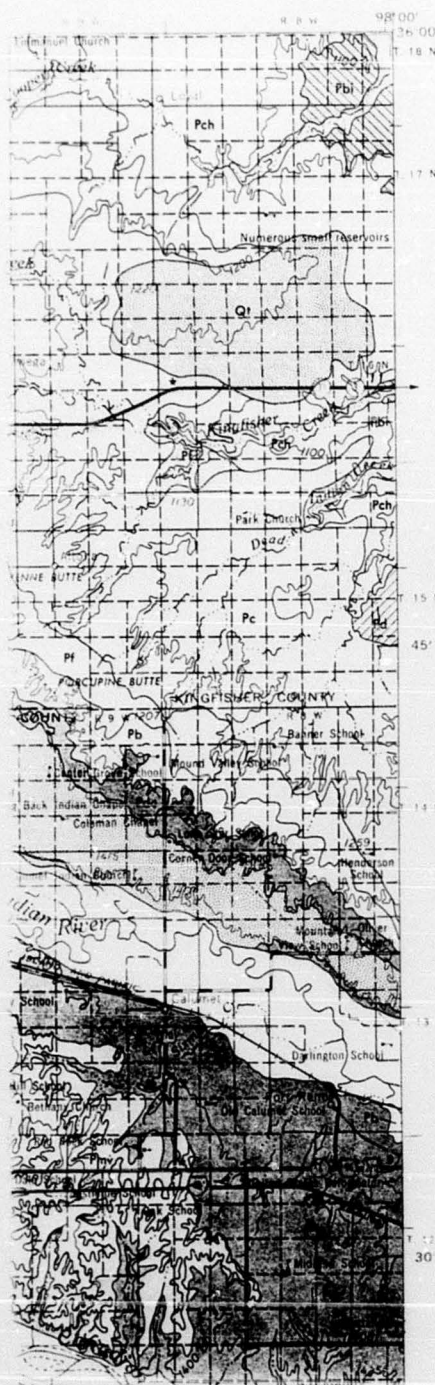
Scale 1:250,000

The University of Oklahoma  
Norman  
1978



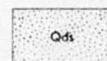


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## EXPLANATION

The stratigraphic nomenclature and age determinations used herein are those accepted by the Oklahoma Geological Survey and do not necessarily agree with those of the U.S. Geological Survey.



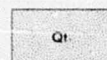
DUNE SAND

Wind-blown sand; thickness ranges from a thin veneer to about 70 feet.



ALLUVIUM

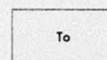
Stream-laid deposits of sand, silt, clay, and gravel; thickness ranges from 0 to about 170 feet.



TERRACE DEPOSITS

Stream-laid deposits of sand, silt, clay, gravel, and volcanic ash; thickness ranges from 0 to about 120 feet.

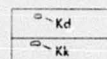
UNCONFORMITY



OGALLALA FORMATION

Gray to light-brown, fine- to medium-grained sand with some clay, silt, gravel, volcanic ash, and caliche beds; locally cemented by calcium carbonate. Thickness ranges from 0 to about 320 feet. The formation thins eastward.

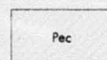
UNCONFORMITY



KIOWA FORMATION and DAKOTA GROUP

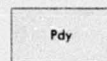
Outliers of the *Kiowa Formation*, Kk, dark-gray shale with some thin beds of fossiliferous tan limestone, range in thickness from a few feet to about 20 feet. Associated in some places is a 5- to 10-foot, gray to brown, coarse-grained sandstone and conglomerate assigned to the overlying *Dakota Group*, Kd (lower sandstone part). Several hundred outliers occur (generally too small to show on map) west of U.S. Highway 183, resting on units ranging from the Rush Springs Formation to the Elk City Sandstone.

UNCONFORMITY



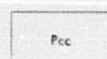
ELK CITY SANDSTONE

Reddish-brown, fine-grained sandstone with minor amounts of silt and clay, weakly cemented by iron oxide, calcium carbonate, and gypsum; maximum thickness 185 feet, top eroded.



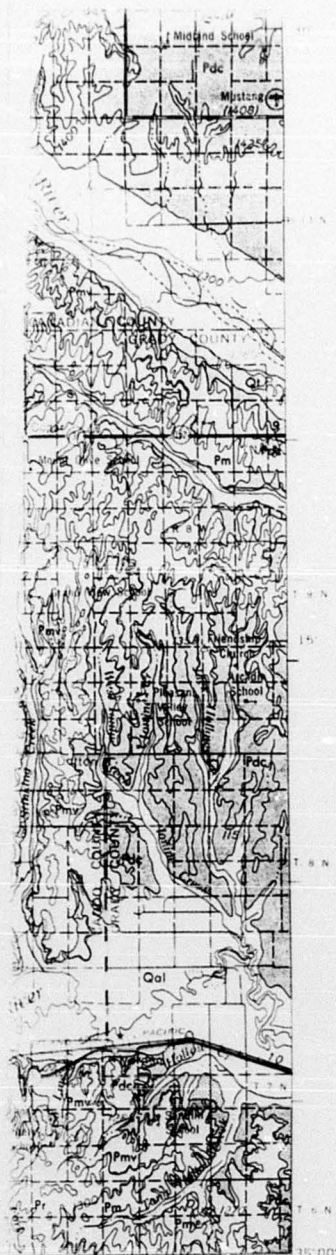
DOXEY SHALE

Reddish-brown, silty shale and siltstone; thickness, about 190 feet.



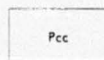
PCC





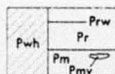
## DOXEY SHALE

Reddish-brown, silty shale and siltstone; thin ss, about 190 feet.



### CLOUD CHIEF FORMATION

Reddish-brown to orange-brown shale, interbedded with siltstone and sandstone in the middle part and some dolomite and much gypsum in lower part; thickness about 400 feet, thinning northward to about 175 feet. The *Moccasin Creek Gypsum Member* is at the base.

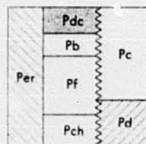


## WHITEHORSE GROUP

Predominantly orange-brown, fine-grained sandstone, the *Whitehorse Group* is mapped as Fwh where separate formations have not been distinguished and as the *Rush Springs Formation* and the *Marlow Formation* where identified.

**Rush Springs Formation, Pr.** orange-brown, cross-bedded, fine-grained sandstone with some dolomite and gypsum beds. Thickness, about 300 feet, thinning northward to about 186 feet. The **Weatherford Gypsum Bed, Prw.** is about 30 to 60 feet below the top (mapped in southeastern part only).

**Malou Formation.** Pm, orange-brown, fine-grained sandstone and siltstone, about 100 to 130 feet thick, thinning northward. This formation has 2 gypsum and (or) dolomite beds in upper 20 feet—the *Emanuel Bed* (at top) and the *Relay Creek Bed* (20 feet below top). Two thin, pink shales occur; the first is 1 foot below the top (*Gracemont*) and the second is 55 feet above the base (unnamed). The *Verden Sandstone Lentil*, Pmv, is a coarse-grained, calcareous, fossiliferous sandstone (2 to 10 feet thick) that occurs in the middle of the Marlow, about 25 feet below the Relay Creek Bed and 85 to 95 feet above the base.



## EL RENO GROUP

Primarily evaporites and reddish-brown shale, with deltaic clastics to the southeast. Where separate formations have not been distinguished, the *El Reno Group* is mapped as Per; the formations listed below have been distinguished and mapped within the Clinton quadrangle as part of the *El Reno Group*.

*Dog Creek Shale*, Pdc, reddish-brown shale with thin beds of siltstone and dolomite; thickness, about 220 feet; gradational eastward into the Chickasha Formation.

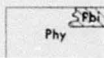
**Blaine Formation**, Pb, 3 to 4 gypsum and dolomite beds, about 100 to 200 feet thick, separated by reddish-brown shale. Gradational southward and eastward into Chickasha Formation.

*Flowerpot Shale*, Pf, reddish-brown shale containing several salt and gypsum beds in the upper part. Thickness, about 300 to 450 feet; gradational southward and eastward into the Chickasha Formation and Duncan Sandstone.

**Cedar Hills Sandstone**, Pch, greenish-gray siltstone and reddish-brown shales; thickness, about 180 feet; gradational southward into Duncan Sandstone.

**Chickasha Formation**, Pc, reddish-brown to maroon mudstone conglomerate with some shale, siltstone, and fine- to coarse-grained sandstone; thickness, about 600 feet; gradational northward and westward into the Flowerpot Shale and the Blaine Formation, and westward into Dog Creek Shale.

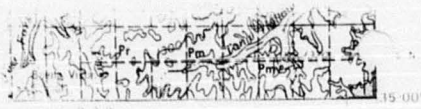
**Duncan Sandstone.** Pd, light-gray and reddish-brown, cross-bedded, fine-grained sandstone and mudstone conglomerate with some interbedded yellowish-gray and reddish-brown shales; thickness, about 200 feet; gradational into the Cedar Hills Sandstone northward and into the Flowerpot Shale northward and westward.



**HENNESSEY GROUP**

Reddish-brown shale with some thin, greenish-grey siltstone and orange-brown sandstone and siltstone beds; thickness, about 500





72 and Robert O. Fay, Oklahoma Geological Survey, 1975

R10W R2W R3W			98°00'
	KINGFISHER		
	15		
	CANADIAN		
	18		
	20		
9			
		6	
16		GRADY	

ORDOVICIAN

Upper Cambrian

CAMBRIAN

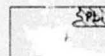
Middle Cambrian

Cambrian

*Cedar Hills Sandstone*, Pch, greenish-gray siltstone and reddish-brown shales; thickness, about 180 feet; gradational southward into Duncan Sandstone.

*Chickasha Formation*, Pc, reddish-brown to maroon mudstone conglomerate with some shale, siltstone, and fine- to coarse-grained sandstone; thickness, about 600 feet; gradational northward and westward into the Flowerpot Shale and the Baine Formation, and westward into Dog Creek Shale.

*Duncan Sandstone*, Pd, light-gray and reddish-brown, cross-bedded, fine-grained sandstone and mudstone conglomerate with some interbedded yellowish-gray and reddish-brown shales; thickness, about 200 feet; gradational into the Cedar Hills Sandstone northward and into the Flowerpot Shale northward and westward.



HENNESSEY

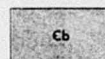
Reddish-brown shale with some thin, greenish-gray siltstone and orange-brown sandstone and siltstone beds; thickness, about 500 feet. The *Hennessey Group* is not subdivided in the southern part of the Clinton quadrangle; in the northeastern corner of the quadrangle, the upper part of the *Bison Formation*, Pbi, is exposed as orange-brown and greenish-gray, fine-grained sandstone and siltstone. The Bison is gradational southward into reddish-brown shale; it thins southward and is about 120 feet thick.

UNCONFORMITY



VIOLA LIMESTONE and BROMIDE FORMATION

Limestone, limestone and shale interbedded, and sandstone; thickness, about 900 feet; one outlier is shown in southern part of quadrangle. Simpson and lower units covered.



ARBUTLE GROUP and TIMBERED HILLS GROUP

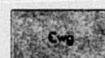
Limestone and dolomite; one outlier at southern end of quadrangle, about 1,200 feet thick.

UNCONFORMITY



CARLTON RHYOLITE GROUP

Rhyolite flows and tuffs; about 4,500 feet thick; one outlier is shown in southern part of mapped area.



WICHITA GRANITE GROUP

Pink, medium-grained granite; three outliers have been mapped in southern part of quadrangle.

Contact

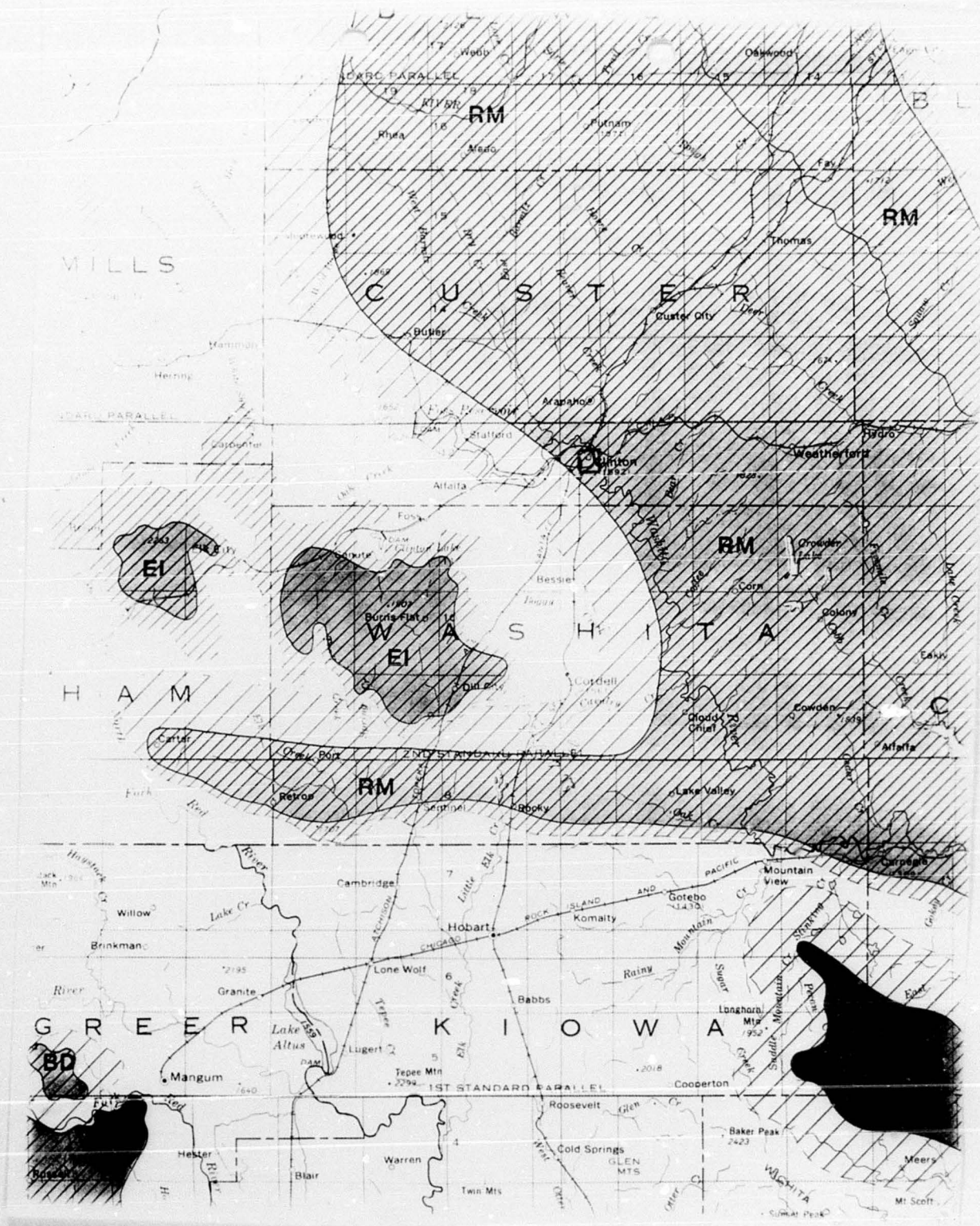
U  
D

Fault, approximately located; dotted where concealed; U, upthrown side; D, downthrown side

*Reference 19*



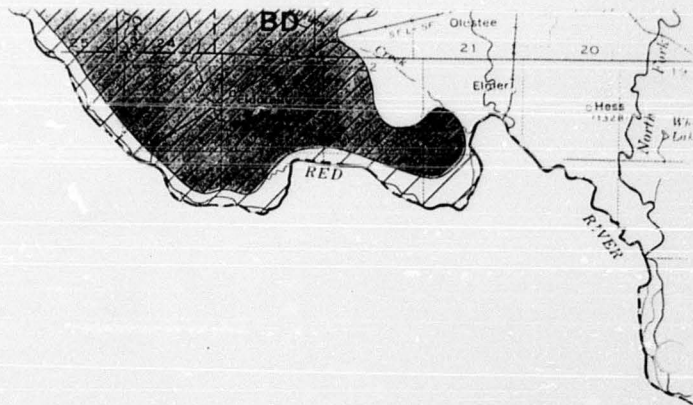






(Ordovician and Cambrian in age). Limestone and dolomite with stone in Arbuckle Mountains region of south-central Oklahoma. 000 to 6,000 ft. Wells commonly yield 25 to 600 gpm of water (ly less than 500 mg/L dissolved solids). Recharge areas include ckle strata; potential recharge areas extend 4 miles beyond aquifer Other Reports 8, 16, 33, 61.

roups (Ordovician and Cambrian in age). Limestone and dolomite ne and shale in the Wichita Mountains-Lawton region of south- thickness is about 5,000 to 6,000 ft. Wells commonly yield 25 to od to fair quality (generally 300 to 2,000 mg/L dissolved solids). aquifer in limestone hills of Wichita Mountains (Caddo-Comanche- l recharge areas include area underlain by aquifer around Lawton nd other areas that extend 4 miles beyond limits of the aquifer. Reports 27, 33, 61.



# MAPS SHOWING PRINCIPAL GROUND-WATER RESOURCES AND RECHARGE AREAS IN OKLAHOMA: SHEET 2 - BEDROCK AQUIFERS AND RECHARGE AREAS

Compiled by  
Kenneth S. Johnson  
Oklahoma Geological Survey

1983

## BEDROCK AQUIFERS

Colored areas on the map show distribution of bedrock aquifers, which are the rock units generally considered favorable or moderately favorable for development of ground-water resources. Bedrock aquifers are listed below by geologic age from oldest to youngest. References, listed at the end of each aquifer description, include Hydrologic Atlases (HA) and Other Reports that provide more detailed information. All references are given in the 4-page pamphlet that accompanies this map.

**Og**

**Ogallala Formation** (Tertiary in age). Loosely cemented layers of fine- to medium-grained sand, silt, clay, and gravel in western Oklahoma and Panhandle; locally contains thin beds of caliche. Thickness generally ranges from 100 to 700 ft. in Panhandle and 100 to 400 ft. elsewhere. Wells commonly yield 25 to 1,500 gpm of water that is of good quality (generally less than 500 mg/L dissolved solids). Recharge areas include all areas where Ogallala crops out or is covered by younger porous and permeable sediments. References: HA-5, HA-8, HA-250, HA-373, HA-450; also Other Reports 12, 13, 17, 21, 22, 23, 24, 25, 26, 28, 30, 31, 32, 33, 40, 42, 43, 52, 54, 55, 61, 66.

**An**

**Antlers Sandstone** (Cretaceous in age). Loosely cemented fine-grained sand and sandstone with some layers of shale and clay in southeastern Oklahoma. The aquifer includes underlying Holly Creek Formation in T. 6 S., Rs. 24-27 E., of eastern McCurtain County. Antlers aquifer typically ranges from 200 to 700 ft. thick. Wells commonly yield 10 to 50 gpm, but in some areas they may yield up to 400 gpm. The water is of good quality (generally 200 to 1,000 mg/L dissolved solids). Recharge areas include outcrops of Antlers Sandstone and overlying Goodland Limestone; potential recharge areas include areas where aquifer underlies younger Cretaceous strata in the south. References: HA-3, HA-9; also Other Reports 9, 20, 33, 61.

**Ei**

**Elk City Sandstone** (Permian in age). Fine-grained sandstone with minor amounts of silt and clay in southwestern Oklahoma. Maximum thickness is about 185 ft. Wells commonly yield 25 to 300 gpm of water that is of good quality (generally less than 500 mg/L dissolved solids). Recharge areas include all outcrops of Elk City Sandstone. References: HA-5; also Other Reports 33, 47, 61.

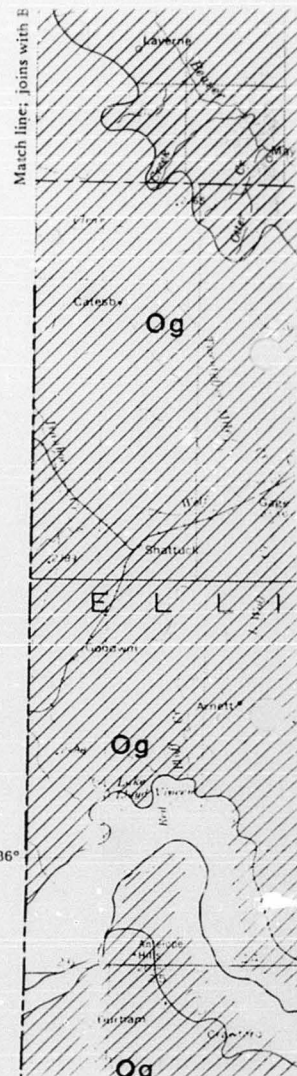
**RM**

**Rush Springs Sandstone and Marlow Formation** (Permian in age). Fine-grained sandstone with some layers of gypsum, shale, and dolomite in western Oklahoma. The amount of shale increases in Dewey County and farther north. Thickness of aquifer ranges from 400 ft. in the south to 200 ft. in the north. Wells commonly yield 25 to 300 gpm of water that is of good quality (generally 200 to 1,000 mg/L dissolved solids), although in some areas of Dewey County and farther north the water locally is of fair to poor quality (1,500 to 4,000 mg/L dissolved solids). Recharge areas include Rush Springs and Marlow outcrops and extend to limits of outcrop on south and east; recharge areas also include outcrops of gypsum and other rocks of overlying Cloud Chief Formation in parts of Caddo, Custer, and Washita Counties. Potential recharge areas in the west extend 4 miles beyond the western limit of the aquifer. References: HA-3, HA-5, HA-6, HA-8; also Other Reports 6, 7, 15, 19, 33, 41, 46, 50, 53, 61, 64, 69.

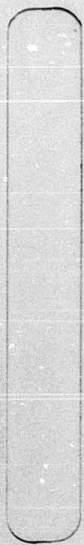
**BD**

**Blaine and Dog Creek Formations** (Permian in age). Gypsum and dolomite layers (locally fractured or cavernous) interbedded with shale in southwestern Oklahoma. The total thickness of the aquifer (the lower part of the Dog Creek Formation and the entire Blaine Formation) is about 250 ft. Wells commonly yield 300 to 2,500 gpm of water that is of fair to poor quality (generally 1,500 to 6,000 mg/L dissolved solids). Recharge areas are outcrops of Blaine, Dog Creek, Rush Springs, and Marlow Formations that overlie the aquifer. Potential recharge areas include other outcrops of Rush Springs, Marlow, Dog Creek, and Blaine strata that dip toward the aquifer. References: HA-5, HA-6; also Other Reports 33, 56, 61, 62.

Match line; joins with E



*Reference 20*





Joan K. Leavitt, M.D.  
Commissioner

**Board of Health**  
John B. Carmichael, D.D.S.  
President  
Ernest D. Martin, R.Ph.  
Vice President  
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Gordon H. Deckert, M.D.  
Dan H. Fleker, D.O.  
Linda M. Johnson, M.D.  
Walter Scott Mason, III  
Lee W. Paden

**OKLAHOMA STATE  
DEPARTMENT OF HEALTH**

**1000 NE TENTH  
OKLAHOMA CITY, OK  
73117-1299**

AN EQUAL OPPORTUNITY EMPLOYER



May 14, 1992

Gene Dousett  
Stream Water Division  
Oklahoma Water Resources Board  
6000 N. Harvey  
P.O. Box 150  
Oklahoma City, OK 73101-150

Dear Mr. Dousett:

The purpose of this letter is to request any information regarding surface water intakes that may be located within 15 miles downstream from the points listed below. The information provided by your office will be used to partly describe surface water targets in the preliminary site assessments conducted by the OSDH, as authorized by a cooperative agreement with the U. S. Environmental Protection Agency.

Point of Entry into Perennial Stream -

- 1) SW4 NW4 NW4 SEC30 T10N R16E McIntosh County IM
- 2) SE4 SE4 SW4 SEC23 T26N R02W Kay County IM
- 3) NE4 NE4 SW4<sup>sec 43</sup> T20N R19E Mayes County IM
- 4) NE4 NE4 SE4 SEC24 T12N R17W Custer County IM

If you have any questions or comments concerning this letter, please call me at (405) 271-7049.

Sincerely,

Richard L. Brooks, R.S.  
Senior Environmental Specialist

Attention: Richard L. Brooks

The attached material is sent to you

☒ In response to your request

☐ For your information

by Gene Doussett

OKLAHOMA WATER RESOURCES BOARD  
P.O. BOX 53585  
OKLAHOMA CITY, OKLAHOMA 73152  
Ph. (405) 271-2555

Comments

Enclosed is a listing of the surface water intakes  
in the general vicinity of interst. If I can be  
of any futher assistance feel free to contact me  
at 231-2505.

**RECEIVED**

JUN 09 1992

Solid Waste Service

## OKLAHOMA WATER USE DATA SYSTEM

## SELECTED STREAM WATER PERMITS

PERMIT	ENTITY	PRIMARY PURPOSE	TOTAL ALLOCATION	SYSTEM	1990 WATER USE	LEGAL DESCRIPTIONS	TYPE
390015	TRAVIS, GORDON	IRRIGATION	135.0	1-8-3	28.3	SW 29 12N 16WIM	A.U. Δ
540400	SMITH, EARL G	IRRIGATION	110.0	1-8-3	0.0	E2 SW 30 12N 16WIM	A.U. Δ
630029	TRAVIS, GORDON	IRRIGATION	160.0	1-8-3	48.3	S2 NE 32 12N 16WIM	A.U. Δ
640139	SNIDER, G P	IRRIGATION	130.0	1-8-3	0.0	S2 NW 22 11N 16WIM	A.U. —
680448	SAWATZKY, WELDON R	IRRIGATION	64.0	1-8-3	0.0	NW 04 11N 16WIM	A.U. Δ
700320	FLAMING, LORENE	IRRIGATION	384.0	1-8-3	0.0	S2 SE 08 11N 16WIM E2 17 11N 16WIM	A.U. Δ A.U. Δ
710304	SMITH, EARL G	IRRIGATION	140.0	1-8-3	0.0	E2 SW 30 12N 16WIM	A.U. Δ
770015	SNIDER, THOMAS	IRRIGATION	140.0	1-8-3	0.0	N2 NE 32 12N 16WIM	A.U. Δ
820072	HINZ, JOHN PAUL	IRRIGATION	88.0	1-8-3	0.0	N2 SE 22 11N 16WIM SW NW SE 22 11N 16WIM SE NW SE 22 11N 16WIM	A.U. — P.D. — P.D. —
820094	SNIDER, LEON	IRRIGATION	75.0	1-8-3	0.0	E2 NE 27 11N 16WIM E2 W2 NE 27 11N 16WIM NE NE NE 27 11N 16WIM SE NW NW 27 11N 16WIM	A.U. A.U. P.D. P.D.
850025	BARTEL, DARREL	IRRIGATION	300.0	1-8-3	25.0	NW 26 11N 16WIM NW NW NW 26 11N 16WIM	A.U. P.D.
650541	SHERWOOD FOREST COMPANY	PUBLIC WATER SUPPLY	1.0	2-3	0.0	SW 06 09N 17EIM	P.D.
760076	MCCLAFLIN, EUGENE	PUBLIC WATER SUPPLY	1.0	2-3	0.1	NE NE 16 09N 17EIM SE NE NE 16 09N 17EIM	A.U. P.D.
320034	WAGNER, CITY OF	PUBLIC WATER SUPPLY	2,096.0	2-16	1,571.3	SW NW 20 18N 19EIM	P.D.
14 PERMITS RETRIEVED.			4,624				

TOTAL WATER USE = 1673.0

**RECEIVED**JUN 09 1992  
Solid Waste Service

0

2

9



*Reference 21*



Def 2445-06

# **Uncontrolled Hazardous Waste Site Ranking System**

## **A Users Manual** (HW-10)

Originally Published in  
the July 16, 1982, *Federal Register*

United States  
Environmental Protection  
Agency

1984





Source: Climatic Atlas of the United States, U.S. Department of Commerce, National Climatic Center, Asheville, N.C., 1979.

**FIGURE 5**  
**NORMAL ANNUAL TOTAL PRECIPITATION (INCHES)**



*Reference 22*



**Joan K. Leavitt, M.D.**  
Commissioner

**Board of Health**  
John B. Carmichael, D.D.S.  
President  
Ernest D. Martin, R.Ph.  
Vice President  
Burdge F. Green, M.D.  
Secretary-Treasurer

Gordon H. Deckert, M.D.  
Don H. Fleker, D.O.  
Linda M. Johnson, M.D.  
Walter Scott Mason, III  
Lee W. Paden

**OKLAHOMA STATE  
DEPARTMENT OF HEALTH**

**1000 NE TENTH  
OKLAHOMA CITY, OK  
73117-1299**

AN EQUAL OPPORTUNITY EMPLOYER



May 14, 1992

Ken Morris  
Planning Division  
Oklahoma Water Resources Board  
6000 N. Harvey  
P.O. Box 150  
Oklahoma City, OK 73101-150

Dear Mr. Morris:

The purpose of this letter is to request information regarding the flood potential of each of the sites listed in the following page. The information provided by your office will be used in the preliminary site assessments conducted by the OSDH, as authorized by a cooperative agreement with the U. S. Environmental Protection Agency.

If you have any questions or comments, please call me at (405) 271-7049.

Sincerely,

Richard L. Brooks, R.S.  
Senior Environmental Specialist

Attachment

Date: May 14, 1992  
To: Ken Morris, OWRB  
From: Richard Brooks, OSDH  
Page 2 of 2

Site	General Location
Oklahoma Steel & Wire	W2 SW4 SE4 SE4 SEC34 T05S R05E Marshall County
Sooner Dial Co.	SE4 NW4 NW4 SEC23 T12N R17W Custer County
Raymond Wichert Property	E2 NW4 SE4 NE4 SEC27 T12N R17W Custer County
Borg Steel (TDR)	SW4 SW4 NW4 SEC32 T20N R13E Tulsa County
Deems Salvage Tonkawa	SE4 SEC15 T26N R02W Kay County
Mid-Continent at Maid	SW4 SEC03 T20N R19E Mayes County
OSU Burial Site	NW4 NE4 NW4 SEC02 T18N R01E Payne County
City of Eufaula Landfill	N2 SE4 SEC25 T10N R15E McIntosh County





## FAX TRANSMITTAL DOCUMENT

DATE: 5/15/92  
TO: Richard L. Brooks  
ORGANIZATION: OSDH - Solid Waste  
TELEPHONE: 271-7049  
FACSIMILE: FOS 271-7079  
NO. OF PAGES: - 12  
INCLUDING COVER

### MESSAGES

IN response to your flood zone requests, only one of the 8 is in a designated flood zone.

CLINTON, Carter Co.

COMMUNITY - panel # 400DS4 000S, effective date 4-3-87, ✓

Flood Bndry Floodway map 523 & 527 are in the SECONDARY of town & both sections lie in ZONE C. FBFM.

Payne Co.

COMMUNITY - panel # 400493 0200C, map revised 2-5-92, Flood Insurance Rate Map or FIRM. All of section 2 is in Zone X, as well as the adjacent sections.

FROM: KEN MORRIS  
DIVISION: Planning  
TELEPHONE: 231-2533

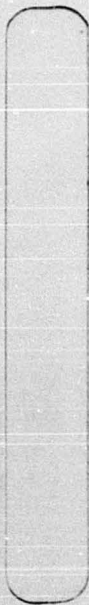
OKC FAX NO.: (405) 231-2600

OKLAHOMA WATER RESOURCES BOARD  
P.O. BOX 150 - 600 N. HARVEY AVE.  
OKLAHOMA CITY, OKLAHOMA 73101-0150

Date: May 14, 1992  
To: Ken Morris, OWRB  
From: Richard Brooks, OSDH  
Page 2 of 2

Site	General Location
Oklahoma Steel & Wire	W2 SW4 SE4 SE4 SEC34 T05S R05E Marshall County <i>not in flood zone</i>
Sooner Dial Co.	SE4 NW4 NW4 SEC23 T12N R17W Custer County <i>not flood zone</i>
Raymond Wichert Property	E2 NW4 SE4 NE4 SEC27 T12N R17W Custer County <i>not flood zone</i>
Borg Steel (TDR)	SW4 SW4 NW4 SEC32 T20N R13E Tulsa County <i>not</i>
Deems Salvage Tonkawa	SE4 SEC15 T26N R02W Kay County <i>not</i>
Mid-Continent at Maid	SW4 SEC03 T20N R19E Mayes County <i>yes imp (see map) asterisk</i>
OSU Burial Site	NW4 NE4 NW4 SEC02 T18N R01E Payne County <i>no</i>
City of Eufaula Landfill	N2 SE4 SEC25 T10N R15E McIntosh County <i>no map printed for this area SIDHAM Purd 3595-28</i>

*Reference 23*





U.S. WILDLIFE SERVICE

# Endangered and Threatened Species of Texas and the Gulf of Mexico

WITH A FOREWORD BY



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7

Craig	Peregrine falcon	Endangered
	Neosho madtom	Threatened
	Western prairie fringed orchid	Threatened
	Prairie mole cricket	Proposed Threatened
	Neosho mucket	Category 2 Candidate
	Paddlefish	Category 2 Candidate
	Arkansas darter	Category 2 Candidate
	Blue sucker	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	Alligator snapping turtle	Category 2 Candidate
Migrant loggerhead shrike	Category 2 Candidate	
Creek	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Carex fissa	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
Migrant loggerhead shrike	Category 2 Candidate	
Custer	Bald eagle	Endangered
	Whooping crane	Endangered
	Interior least tern	Endangered
	Peregrine falcon	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
Western Snowy plover	Category 2 Candidate	
Delaware	Gray bat	Endangered
	Ozark big-eared bat	Endangered
	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Piping plover	Threatened
	Ozark cavefish	Threatened
	Prairie mole cricket	Proposed Threatened
	Ozark chinquapin	Category 1 Candidate
	(Castanea pumila var. ozarkensis)	
	Royal catchfly (Silene regia)	Category 2 Candidate
	Ozark spiderwort	
	(Tradescantia ozarkana)	Category 2 Candidate
	Lake cress	
	(Armoracia aquatica)	Category 2 Candidate
	Ozark cave crayfish	Category 2 Candidate
	Neosho mucket	Category 2 Candidate
	Paddlefish	Category 2 Candidate
	Blue sucker	Category 2 Candidate
Arkansas darter	Category 2 Candidate	
Migrant loggerhead shrike	Category 2 Candidate	
Eastern small-footed bat	Category 2 Candidate	
Dewey	Whooping crane	Endangered
	Bald eagle	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Swift fox	Category 2 Candidate

Texas	Bald eagle	Endangered
	Interior least tern	Endangered
	Whooping crane	Endangered
	Peregrine falcon	Endangered
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Mountain plover	Category 2 Candidate
Swift fox	Category 2 Candidate	
Tillman	Interior least tern	Endangered
	Whooping crane	Endangered
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
Texas kangaroo rat	Category 2 Candidate	
Tulsa	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Interior least tern	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Paddlefish	Category 2 Candidate
	Arkansas River shiner	Category 1 Candidate
	Arkansas River speckled chub	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
	Wagoner	Peregrine falcon
Bald eagle		Endangered
Interior least tern		Endangered
Piping plover		Threatened
Prairie mole cricket		Proposed Threatened
Ozark spiderwort		
(Tradescantia ozarkana)		Category 2 Candidate
Paddlefish		Category 2 Candidate
Blue sucker		Category 2 Candidate
Arkansas River shiner		Category 1 Candidate
Arkansas River speckled chub		Category 2 Candidate
Alligator snapping turtle		Category 2 Candidate
Texas horned lizard		Category 2 Candidate
Migrant loggerhead shrike		Category 2 Candidate
Washington	Peregrine falcon	Endangered
	Bald eagle	Endangered
	Piping plover	Threatened
	Prairie mole cricket	Proposed Threatened
	Ozark chinquapin	Category 1 Candidate
	(Castanea pumila var. ozarkensis)	
	Alligator snapping turtle	Category 2 Candidate
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
	Western Snowy plover	Category 2 Candidate
	Mountain plover	Category 2 Candidate
	Migrant loggerhead shrike	Category 2 Candidate
Washita	Whooping crane	Endangered
	Prairie mole cricket	Proposed Threatened
	Texas horned lizard	Category 2 Candidate
	White-faced ibis	Category 2 Candidate
	Ferruginous hawk	Category 2 Candidate
	Long-billed curlew	Category 2 Candidate
Western Snowy plover	Category 2 Candidate	



*Reference 24*



## Memorandum

July 7, 1992

To: Sooner Dial Pa File

From: David S. Crow, OSDH *DSC*

Re: Population within study radius.

The estimated population residing within the study area was determined through the following procedures:

**on-site:** (the # of residences within 200 feet X 2.55) + # of workers on-site.

**0 - 1/4 mile radius:** residence count from the appropriate USGS map.

**1/4 - 3 mile radii:** GEMS database.

**3 - 4 mile radius:** residence count from the appropriate USGS map.

The estimated residing population per study radii is described below.

Study Radius (mi)	Estimated Residences	Total Number of Estimated persons
On-site	3 on-site workers + (5 residences X 2.55)	15.75
0 - 1/4	193 X 2.55	492.15
1/4 - 1/2	NA	868
1/2 - 1	NA	2969
1 - 2	NA	4933
2 - 3	NA	26
3 - 4	104 X 2.53	263.12
<b>Total</b>		<b>9567.02</b>

### Sources:

1. On-site reconnaissance memorandum
2. GEMS (Graphic Exposure Modelling System)
3. Area topographic maps: Clinton, Cordell, Butler, Dill City, NE.
4. U.S. Department of Commerce, 1990 Census Data for Custer, and Washita counties. Persons per household in Custer County: 2.55. Persons per household in Washita County: 2.53.

Alt-Z Help |Alt-Tab Menu| EC | | |FDX|CR| | MTEZ by MagicSoft, Inc.  
Enter the next ring distance  
GEMS>

Enter program execution mode: B (batch) or I (interactive)  
GEMS> I

SOONER DIAL CO

LATITUDE 35:30:18 LONGITUDE 98:58:19 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	1095	2594	0	0	3689
S 2	0	0	0	0	0	0	0
S 3	0	0	0	0	0	0	0
S 4	0	0	1172	0	26	0	1198
S 5	0	0	0	797	0	0	797
S 6	0	868	702	1542	0	0	3112
RING TOTALS	0	868	2969	4933	26	0	8796

press RETURN to continue

*Compiled by RLB 7/9/92*



Table 1. Selected Population and Housing Characteristics: 1990  
Custer County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	26,897	Total housing units	11,636
SEX		OCCUPANCY AND TENURE	
Male	13,131	Occupied housing units	9,918
Female	13,766	Owner occupied	6,293
		Percent owner occupied	63.5
AGE		Renter occupied	3,625
Under 5 years	1,924	Vacant housing units	1,718
5 to 17 years	5,191	For seasonal, recreational, or occasional use	180
18 to 20 years	2,204	Homeowner vacancy rate (percent)	3.3
21 to 24 years	2,184	Rental vacancy rate (percent)	13.5
25 to 44 years	7,446		
45 to 54 years	2,353	Persons per owner-occupied unit	2.61
55 to 59 years	1,032	Persons per renter-occupied unit	2.46
60 to 64 years	975	Units with over 1 person per room	389
65 to 74 years	1,801		
75 to 84 years	1,338	UNITS IN STRUCTURE	
85 years and over	449	1-unit, detached	8,102
Median age	29.7	1-unit, attached	198
Under 18 years	7,115	2 to 4 units	803
Percent of total population	26.5	5 to 9 units	455
65 years and over	3,588	10 or more units	560
Percent of total population	13.3	Mobile home, trailer, other	1,518
HOUSEHOLDS BY TYPE		VALUE	
Total households	9,918	Specified owner-occupied units	4,691
Family households (families)	6,851	Less than \$50,000	2,503
Married-couple families	5,693	\$50,000 to \$99,999	1,842
Percent of total households	57.4	\$100,000 to \$149,999	251
Other family, male householder	275	\$150,000 to \$199,999	61
Other family, female householder	883	\$200,000 to \$299,999	30
Nonfamily households	3,067	\$300,000 or more	4
Percent of total households	30.9	Median (dollars)	46,900
Householder living alone	2,519		
Householder 65 years and over	1,016	CONTRACT RENT	
Persons living in households	25,333	Specified renter-occupied units	
Persons per household	2.55	paying cash rent	3,217
		Less than \$250	2,116
GROUP QUARTERS		\$250 to \$499	1,061
Persons living in group quarters	1,564	\$500 to \$749	36
Institutionalized persons	576	\$750 to \$999	3
Other persons in group quarters	988	\$1,000 or more	1
		Median (dollars)	219
RACE AND HISPANIC ORIGIN		RACE AND HISPANIC ORIGIN	
White	22,896	OF HOUSEHOLDER	
Black	930	Occupied housing units	9,918
Percent of total population	3.5	White	8,849
American Indian, Eskimo, or Aleut	1,660	Black	292
Percent of total population	6.2	Percent of occupied units	2.9
Asian or Pacific Islander	169	American Indian, Eskimo, or Aleut	407
Percent of total population	0.6	Percent of occupied units	4.1
Other race	1,242	Asian or Pacific Islander	44
Hispanic origin (of any race)	1,625	Percent of occupied units	0.4
Percent of total population	6.0	Other race	326
		Hispanic origin (of any race)	400
		Percent of occupied units	4.0

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

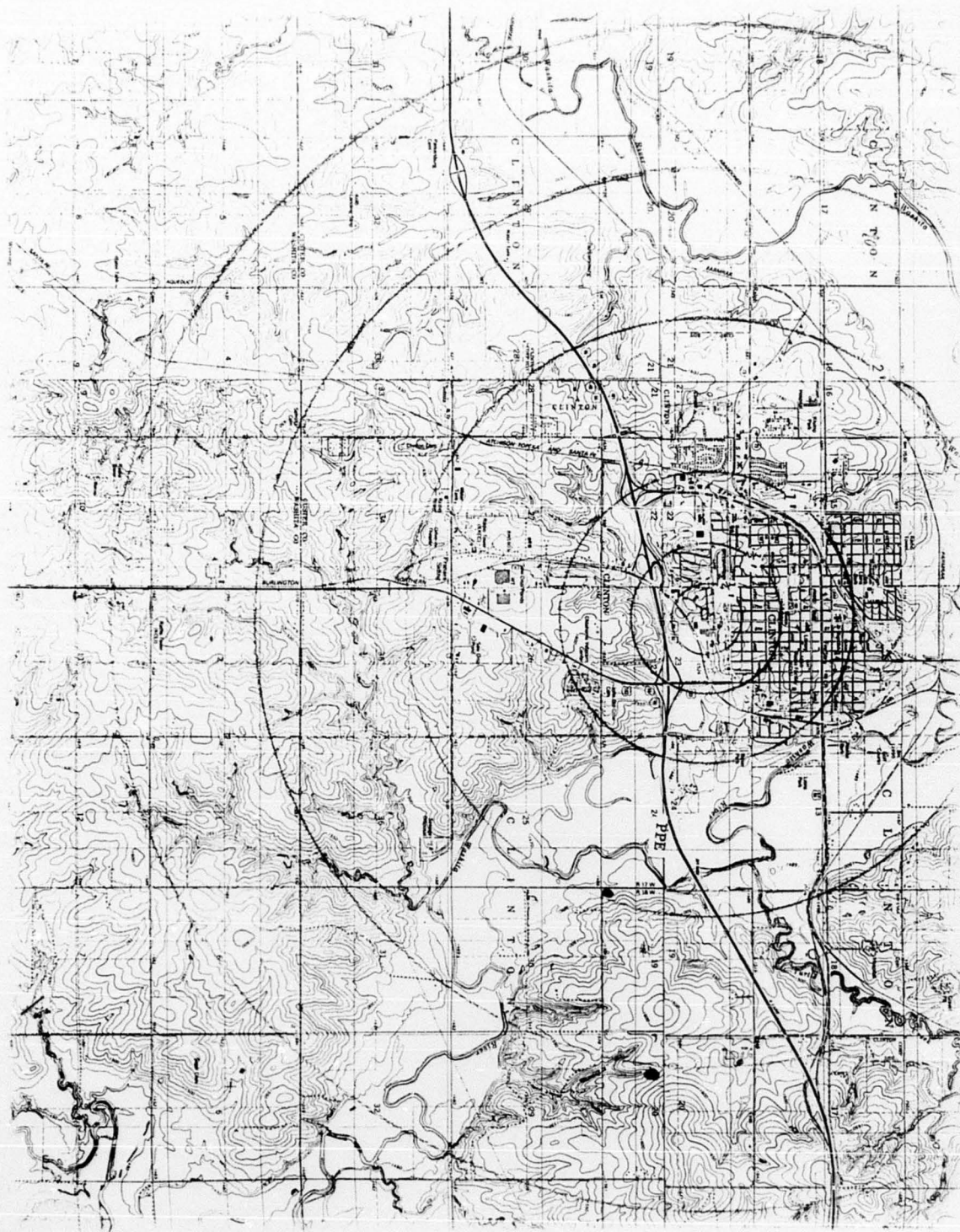
Table 1. Selected Population and Housing Characteristics: 1990  
Washita County, Oklahoma

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 1, 1991.

Total population	11,441	Total housing units	6,101
SEX		OCCUPANCY AND TENURE	
Male	5,524	Occupied housing units	4,421
Female	5,917	Owner occupied	3,384
		Percent owner occupied	76.5
AGE		Renter occupied	1,037
Under 5 years	768	Vacant housing units	1,680
5 to 17 years	2,321	For seasonal, recreational, or occasional use	54
18 to 20 years	344	Homeowner vacancy rate (percent)	3.3
21 to 24 years	424	Rental vacancy rate (percent)	44.7
25 to 44 years	3,020		
45 to 54 years	1,160	Persons per owner-occupied unit	2.47
55 to 59 years	549	Persons per renter-occupied unit	2.73
60 to 64 years	591	Units with over 1 person per room	117
65 to 74 years	1,169	UNITS IN STRUCTURE	
75 to 84 years	809	1-unit, detached	4,542
85 years and over	286	1-unit, attached	789
Median age	35.8	2 to 4 units	50
Under 18 years	3,089	5 to 9 units	43
Percent of total population	27.0	10 or more units	60
65 years and over	2,264	Mobile home, trailer, other	617
Percent of total population	19.8	VALUE	
HOUSEHOLDS BY TYPE		Specified owner-occupied units	2,313
Total households	4,421	Less than \$50,000	1,811
Family households (families)	3,291	\$50,000 to \$99,999	433
Married-couple families	2,901	\$100,000 to \$149,999	56
Percent of total households	65.6	\$150,000 to \$199,999	9
Other family, male householder	106	\$200,000 to \$299,999	3
Other family, female householder	284	\$300,000 or more	1
Nonfamily households	1,130	Median (dollars)	28,400
Percent of total households	25.6	CONTRACT RENT	
Householder living alone	1,064	Specified renter-occupied units paying cash rent	732
Householder 65 years and over	621	Less than \$250	545
Persons living in households	11,199	\$250 to \$499	179
Persons per household	2.53	\$500 to \$749	8
GROUP QUARTERS		\$750 to \$999	-
Persons living in group quarters	242	\$1,000 or more	-
Institutionalized persons	238	Median (dollars)	181
Other persons in group quarters	4	RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
RACE AND HISPANIC ORIGIN		Occupied housing units	4,421
White	10,948	White	4,294
Black	20	Black	9
Percent of total population	0.2	Percent of occupied units	0.2
American Indian, Eskimo, or Aleut	260	American Indian, Eskimo, or Aleut	68
Percent of total population	2.3	Percent of occupied units	1.5
Asian or Pacific Islander	28	Asian or Pacific Islander	5
Percent of total population	0.2	Percent of occupied units	0.1
Other race	185	Other race	45
Hispanic origin (of any race)	406	Hispanic origin (of any race)	103
Percent of total population	3.5	Percent of occupied units	2.3

The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

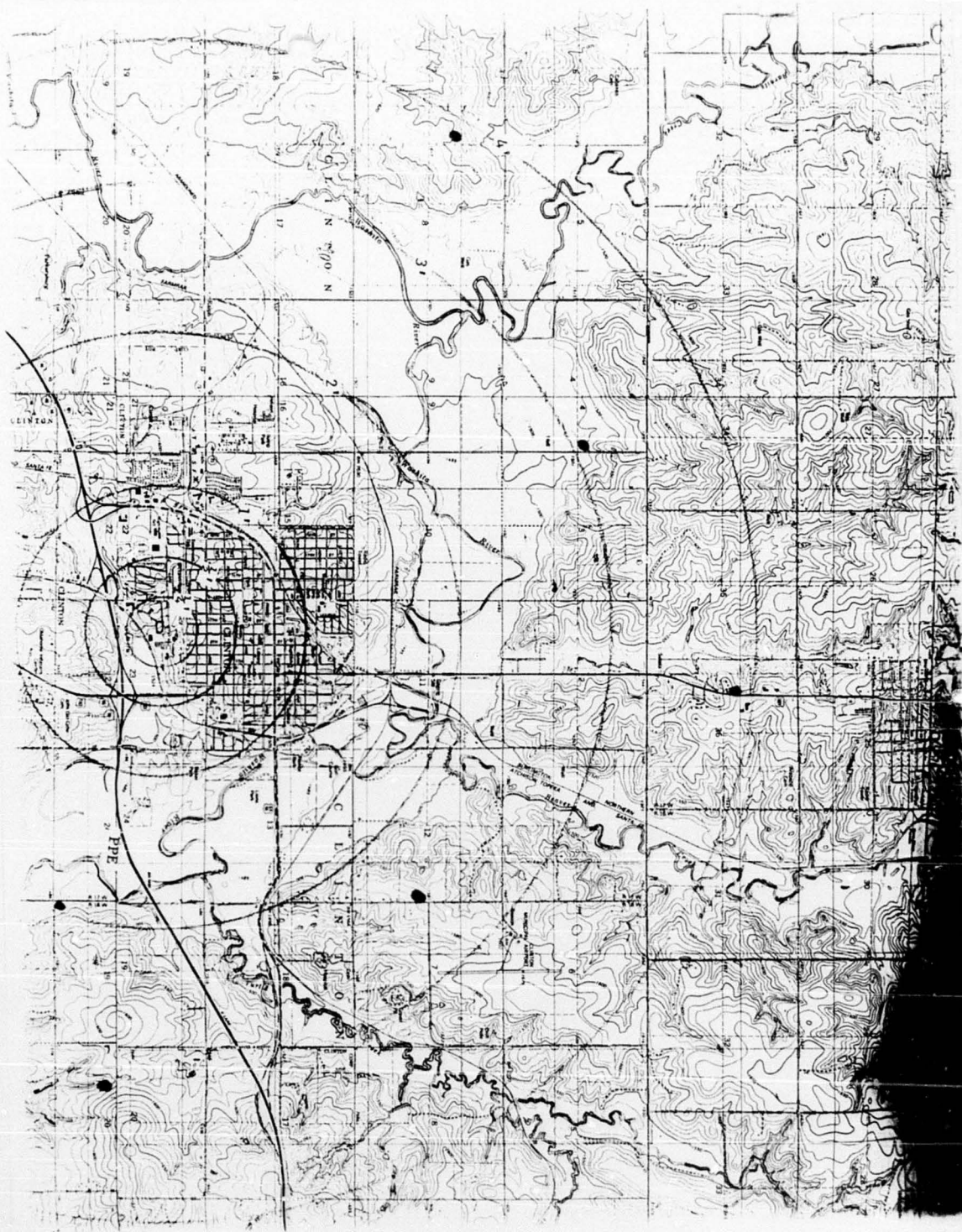




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*Reference 25*





## WETLAND ACREAGE WORKSHEET

SITE: Sooner Dial, Clinton, Oklahoma

Listed below are the estimated wetland acreage within four miles of the stated site. The acreages was derived by summing all designated wetland areas for each study radius with the use of the "Wetland Acreage Guide" of the appropriate inventory maps.

STUDY RADIUS (mi)	ESTIMATED WETLAND SIZE (acres)
On-site	0
0 - 1/4	0
1/4 - 1/2	0
1/2 - 1	about 0.5
1 - 2	about 40.0
2 - 3	about 60.0
3 - 4	about 110.0
<b>TOTAL</b>	<b>210.5</b>

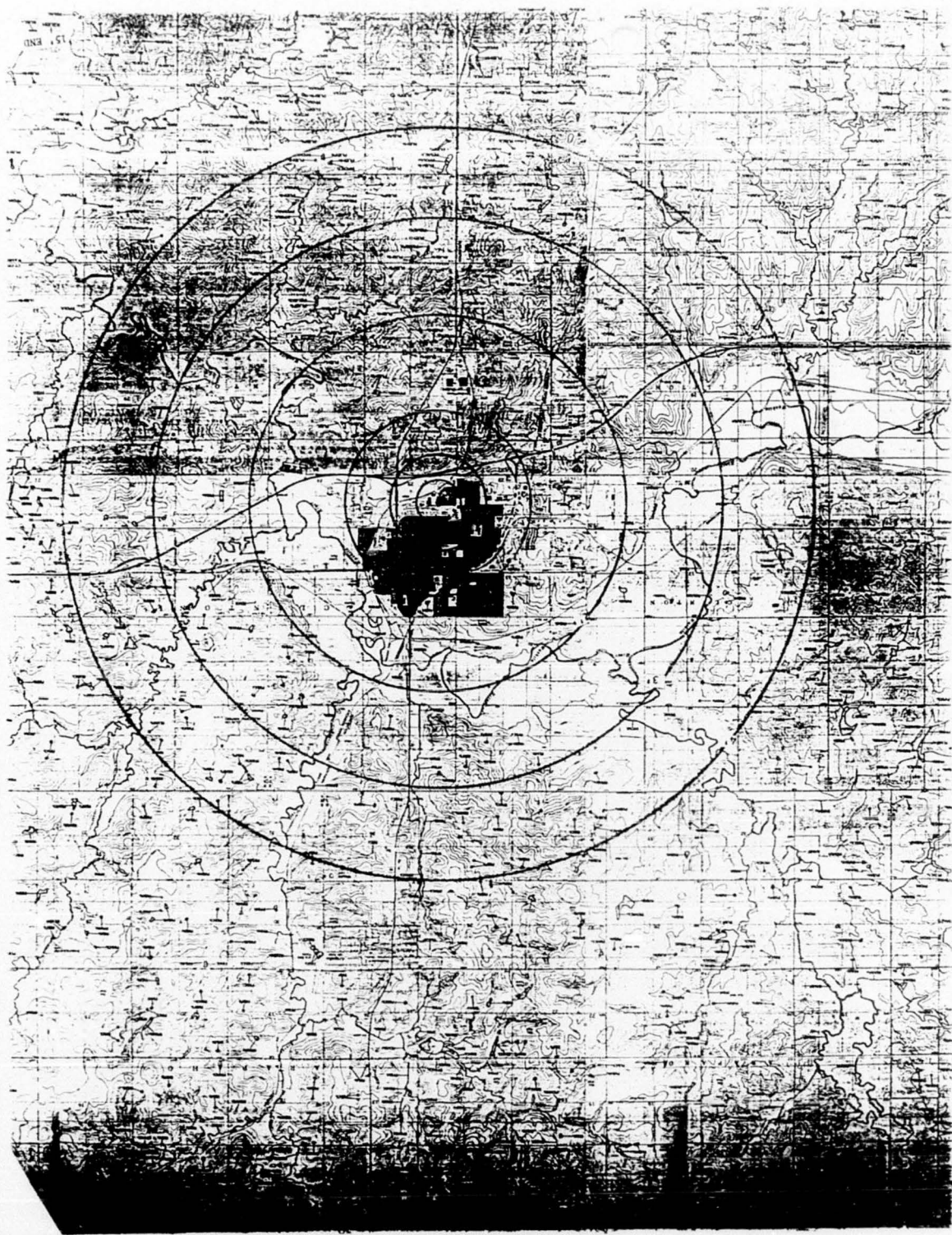
### Source of Information:

U.S. Department of Interior. *National Wetlands Inventory Quadrangle Maps:*

1. Clinton, OK
2. Stafford, OK
3. Bessie, OK
4. Dill City, OK

Compiled by: Karen Khalafae Date: 070792





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